

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.

For Sale—New and second hand iron-working machinery. Prompt delivery. W. P. Davis, Rochester, N.Y. Tuerk water motors at 12 Cortlandt St., New York.

For best hoisting engine, J. S. Mundy, Newark, N. J. Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J.

Wanted—Right parties to push new patent, or will sell. Address box 832, Hartford, Conn.

Best electroplating machinery. Low prices. Redding Electric Co., 48 Hanover St., Boston.

Send to H. W. Knight & Son, Seneca Falls, N. Y., for catalogue of pattern letters and figures.

Billings' Patent Breech-loading Single Barrel Shotgun. Billings & Spencer Co., Hartford, Conn.

Belting.—A good lot of second hand belting for sale cheap. Samuel Roberts, 369 Pearl St., New York.

Best Ice and Refrigerating Machines made by David Boyle, Chicago, Ill. 140 machines in satisfactory use.

Steam Hammers, Improved Hydraulic Jacks, and Tube Expanders. R. Dudgeon, 21 Columbia St., New York.

Safety Elevators, steam and belt power; quick and smooth. The D. Frisbie Co., 112 Liberty St., New York.

"How to Keep Boilers Clean." Send your address for free 56 p. book. Jas. C. Hatchkiss, 120 Liberty St., N. Y.

Screw machines, milling machines, and drill presses. The Garvin Mach. Co., Laight and Canal Sts., New York.

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

Guild & Garrison, Brooklyn, N. Y., manufacture steam pumps, vacuum pumps, vacuum apparatus, air pumps, acid blowers, filter press pumps, etc.

For low prices on Iron Pipe, Valves, Gates, Fittings, Iron and Brass Castings, and Plumbers' Supplies, write A. & W. S. Carr Co., 138 and 140 Centre St., New York.

For the original Bogardus Universal Eccentric Mill, Foot and Power Presses, Drills, Shears, etc., address J. S. & G. F. Simpson, 26 to 38 Rodney St., Brooklyn, N. Y.

The Holly Manufacturing Co., of Lockport, N. Y., will send their pamphlet, describing water works machinery, and containing reports of tests, on application.

The best book for electricians and beginners in electricity is "Experimental Science," by Geo. M. Hopkins. By mail, \$4; Munn & Co., publishers, 361 Broadway, N. Y.

Wanted—Foreman for machine shop in large city in Wisconsin, employing about 100 men. One posted on Corliss engines and ice machines and who understands German preferred. Address Foreman, care Scientific American, New York.

Wanted, mechanic or designer of machinery, familiar with wire bending and paper bag machines, to design and make an attachment to latter, to make and attach wire fasteners to paper bags. For particulars address A. G. Blincoe, Loretto, Ky.

Send for new and complete catalogue of Scientific and other Books for sale by Munn & Co., 361 Broadway, New York. Free on application.

Notes & Queries

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

(2191) F. H. W. writes: Can you tell me something that I can use to coat either zinc or wood that will not be affected by acids or chemical action of any kind? It is for a photographer's sink that I want it. A. Use wood, and smear over with 4 parts resin, 1 part gutta percha and a little boiled oil, melted together and applied hot to the perfectly dry wood. Do not use zinc.

(2192) L. P. L. asks: With what force will a body weighing 150 pounds strike a jumping net, falling from a height of 45 feet, and how many men will it take to hold the net? Size of net 10 feet in diameter, woven like a spider's web. Body falling from natural gravity. A. The body will touch the net with a velocity of 53 1/2 feet per second, and evolve a force of 4 foot tons, or 8,000 pounds through a space of 1 foot. If its fall is stopped in a distance of 3 feet after touching the net, the final weight of impact on the net will be 2,666 pounds. It will take more men than can grab the net to stop the fall.

(2193) Subscriber asks: Which is the more economical for feeding a 40 horse power tubular boiler, a power or steam pump, and why? Said pump to be used for nothing else, and all the water to go through a heater, warmed by the exhaust from the engine. Steam pressure on boiler, from 80 to 90 pounds. A. The power pump is the most economical, because the engine, if a good one, is more economical than a pump for a given power. In the steam pump the steam follows full stroke, while the steam engine utilizes the economy of expansion and has also less clearance than a steam pump, and a less per cent of friction.

(2194) S. P. C. asks how to prepare glue size in liquid form to keep fluid at 34° to 40° above zero. I want to use it with resin and wood alcohol to fill a paper surface. A. Mix your glue after solution in

water with vinegar or nitric acid. Try first an equal measure of strong vinegar. If insufficient, add some nitric acid.

(2195) E. L. asks: Is there any way whereby the quicksilver can be restored or the vacant spots restored where the quicksilver is off in spots on a mirror? A. Take a small fragment of mirror, put mercury on its back, push off the coating, and let it drop upon the spot, press with a piece of tin foil above it. Success is doubtful.

(2196) R. H. S. asks (1) the formula for fluid that will allow the zinc to be left in a one-fluid plunge battery when not in use. I have reference to a battery for running a small motor. A. Keep zincs thoroughly amalgamated. Even then they will be attacked except in caustic soda batteries. In latter amalgamation is not needed. 2. Any difference between chloride of lime and chloride of calcium? A. One consists of chlorine and calcium (CaCl2), the other contains oxygen also (CaCl2O principally). 3. Is bichromate of soda better than bichromate of potash for a fluid in carbon battery? A. It does not form the troublesome chrome alum crystals. 4. How far would a body have to be from the earth so the attractions of sun and earth would attract it equally? What is the rule for the above query? A. In general terms the square of the distances from earth and sun should be directly as the weights of earth and sun.

(2197) A. H. A. asks how to plate with fourteen carat gold. A. If you will mix copper cyanide and gold cyanide solutions by varying the area of your anode, you may get an alloy deposit. Brass can be thus deposited. The color of the deposit is the only guide, and in your case this would be hardly available.

(2198) J. J. B. asks whether there is any plant or vegetable known to science that contains mercury in any shape or form. A. None is known. 2. And if there is any vegetable or plant that contains iron, and if so, to what extent? A. Nearly all contain traces of it.

(2199) F. A. K. asks: 1. What is terra japonica made of? A. It is an aqueous extract from the wood of the Acacia catechu (nat. ord. Leguminosae, Mimoseae). 2. Will it injure the iron or steel of steam boilers if used as a scale remover? A. No. 3. If it is not a good article for above purpose, what would you recommend? A. Carbonate of soda may be used if the other does not answer.

(2200) H. B. asks what the composition of oroidis is, such as writing pens are made of, and how are such pens made.

Table with 2 columns: Material and Quantity. A. Copper... 68 2/3 parts. Zinc... 13 5/2 ". Tin... 0 4/8 ". Iron... 0 2/4 ". Pens are made from sheet metal by stamping.

(2201) R. H. D. asks for a formula for boiling meerschaum pipes. A. Heat wax up to boiling. Plug openings in pipe, and plunge it into wax for 1 minute. It should be done by an experienced person, as you may injure the pipe. Try your hand upon one of little value, as they often crack. Milk may be used instead of wax for slow coloring.

(2202) E. S. M. asks for a recipe for a black kalsomine, which, when applied to a white wall, will give a dull black. For one gallon soak 1/2 pound good glue in water, heat until dissolved, and dilute to one gallon. Mix with this lamp black, and if desired a little whitening to give it a body.

(2203) R. B. asks for a formula for a good furniture polish to use on furniture in use. A. Mix oil of amber (refined) and olive oil, 1 pound of each, with 1 ounce tincture of henna. 2. How to destroy water bugs and other insects that are in dwellings. A. Use fresh Persian powder; for water bugs use powdered borax.

(2204) A. B. S. asks: Will you kindly advise me by return mail if there are any two or three kinds of metal that will form an electric current when brought in contact with each other? A. Practically no.

(2205) L. A. J. asks for a receipt for making waterproof cement, to be used in constructing aquarium. A. Take 25 parts gutta percha in shreds and melt it carefully. Add 75 parts ground pumice stone, and then mix in 150 parts Burgundy pitch and melt well together.

(2206) E. W. M. asks: 1. Can No. 24 cotton-wound copper wire be used for the secondary coil of an induction coil? If it can, what should I use for the primary coil? Also, how much tin foil is necessary for the condenser of such a coil? A. Wire of this size is not suitable for a spark coil. No. 36 should be used. Two layers of No 16 would answer for the primary of an induction coil 8 or 10 inches long. It requires from 30 to 40 square feet of tin foil for the condenser. 2. How many cells of Grenet battery are necessary to operate it (size of zinc and carbons 4 3/4 by 1 3/4 in.)? A. From 4 to 6, connected two in parallel. 3. Can No. 24 wire be used on a small electric locomotive like the one in SUPPLEMENT, No. 19, page 301? A. Yes. 4. How many Grenet cells are needed to run a locomotive so made, the track being of copper and about five feet in diameter? A. Two or three. 5. What is a good formula for blue prints on rough drawing paper? A. For information on blue prints consult SUPPLEMENT, Nos. 585 and 514.

(2207) H. H. G. says: I would like you to explain in the SCIENTIFIC AMERICAN why the moon which full on April 5 was so late in getting up? On the 1st of the month it did not rise until 23.45, when, according to the N. W. Almanac, it was due at 20.8. It has caused considerable comment about here, as moons at that stage rise so much earlier than this one. A. On April 7 the moon rose at 21 h. 9 m. by our almanac. The moon is generally very steady in her habits of rising and setting. Mankind and their time keepers are not so steady.

(2208) W. L. asks: 1. Would a cast iron ring two inches diameter, two and one-half inches wide and one-fourth inch thick, do for an armature core for a small electric motor, or would it not be thick

enough? A. Better use a ring formed of wire. Cast iron will not answer well in this place. A. Please tell me what these "fire eaters" use and how they use? Something which they blow out of their mouth, which will ignite by a flame? A. A piece of lamp wick an inch long is soaked in nitrate of soda solution. This is lighted and embedded in tow, which is held in the mouth. By blowing through this or by closing the mouth on it, the effects can be produced. 3. What elements does the new Edison battery contain, and what solution? A. Zinc and solidified black oxide of copper. The solution is caustic potash and water. 4. If a current of 110 volts be passed through a rheostat, which will be reduced—the volts or the amperes? A. The amperes. 5. Why is it that if a current be turned on to a motor too quickly, it will burn the armature out? A. Because the resistance of still or slow-moving motor is so small as to allow too much of the current to pass.

(2209) S. B. asks: Is hypnotism a humbug or not? A. Hypnotism is a legitimate subject of study for scientists. It is still a subject of investigation, and no very definite conclusions have been reached. Those who lay claim to an occult knowledge of it may generally be set down as impostors.

(2210) R. M. N. asks: 1. Please give the method of embalming flowers, and chemicals used? A. As generally executed, embalming flowers consists in making wax imitations or copies, and this is really the best approach to the real thing. No good embalming process has been discovered applicable in all cases. 2. Give process of making India ink. A. It is made from fine lampblack compacted and cemented with glue. The finest black is said to be derived from pork fat. The glue is made from Buffalo bone. The process is described in "Workshop Receipts," 2d series, p. 335. 3. Which moves more easily on a plane—a large or small wheel? A. A large wheel. 4. Can fish be drowned? If so, under what circumstances? A. Yes; if the action of their gills is disturbed or interfered with.

(2211) S. B. asks: 1. How to temper a drill so it would be hard enough to drill holes in glass? A. A drill heated to a low red, and plunged in a strong solution of chloride of zinc, will drill glass. 2. Also where can I obtain a book that treats entirely on electricity, so as to enable me to work on electricity or to experiment on various subjects? A. "Experimental Science" will probably meet your wants, although it does not treat solely the subject of electricity.

(2212) J. C. B. says: A dispute arose upon which I wish your opinion. A 3 inch safety valve has an outlet or a waste pipe of 3 inches in diameter. As the safety valve is weighted at 100 pounds to the square inch, one person contends that a 2 inch waste pipe will give abundant outlet. Others contend that the waste pipe should be of the full dimension of the orifice of the safety valve. As the steam exhausts into the atmosphere against 15 pounds to the square inch, it seems reasonable that a 2 inch waste pipe would give abundant room for all the steam to escape which would issue from a 3 inch aperture against a hundred pounds pressure. A. A 2 1/2 inch outlet is generally used for a 3 inch safety valve, although a 2 inch outlet will discharge all the steam that will escape through a 3 inch valve as ordinarily used. The construction of safety valves does not admit of their full opening, seldom more than one tenth their capacity when opened under boiler pressure.

(2213) W. R. writes: I have 30 cells of gravity battery, each cell having an E. M. F. of 1 volt; would above mentioned battery do for electric lighting, and what candle power lamp would it supply? Would it be as good for the purpose, and give the same amount of current, as 15 cells of bichromate of potash battery, each cell having an E. M. F. of 2 volts? A. Owing to the great resistance of the gravity battery, it is not adapted to electric lighting purposes. By applying Ohm's law, you will readily see the difference between the two batteries. Thirty cells of gravity battery would have a resistance of 90 ohms at least. A 30 volt lamp has a resistance of 25 ohms. The least possible total resistance would therefore be 115 ohms. According to Ohm's law E = C we will have I = 25 amperes. The lamp requires a current of 1.20 amperes. Under the same conditions the bichromate battery would yield a current of 0.92, which is about 3/4 times greater than that from the gravity battery, but still insufficient for a single 30 volt lamp.

(2214) J. E. F. L. asks: What is the desired object to be attained in "squaring the circle"? A. It resolves itself into finding the ratio between circumference and radius. The original idea was to describe a square of area equal to a circle.

(2215) W. M. D. writes: Can you tell me of some plan for preventing the green stains on marble caused by water dripping from a bronze tablet? We have a soldiers' monument with a bronze tablet let into each of its four faces, and the marble below the tablets is streaked with green. I would like to know how to remove the stains and to prevent the formation of more in the future. A. Treat the stains by process given in query 2176. When the marble is clean, go over it with hot paraffin. The cure will not be a perfect one.

(2216) C. F. T. writes: 1. Is there any way I could stain or color a white glass bottle to a deep ruby color? A. Mix clear dammar varnish with red extract of alkanet root and varnish the bottle. 2. How can I smooth the inside of a piece of half inch gas pipe about 3 1/2 ft. long? I have neither drill nor reamer long enough. A. Only by mechanical means, such as a stick coated with glue and emery. The operation may prove a long one.

(2217) F. E. K. J. asks: How can I make a fluid like binders use in ruling letter paper? I made same with aniline and water, but it seemed to flow too freely. A. Add a little gum arabic solution to your ink. Aniline will fade. A dilute solution of sulphindigotic acid with gum arabic would be more permanent.

(2218) W. H. writes: Every week I receive an English paper containing an advertisement wherein the word "patentor" occurs. I am unable to find authority for the word. Will you kindly inform

me if it is proper, and if so, why is it not generally used? A. Patentee means one who has patented, and is applicable to all recipients of patents. Patentor indicates one who is engaged in patenting, and while it could be used in the other sense, seems to present no particular advantage, and certainly lacks authority.

(2219) G. H. S. asks: If there is any fluid or liquid in existence which always remains the same in weight and quantity, and which climate has no influence on. A. Probably mercury comes the nearest to your requirements; glycerine, or a non-drying oil, such as olive or sweet almond oil, approximate thereto.

(2220) W. H. O. writes: Is there any difference in the degree or extent to which water and (or) oil may be reduced in bulk by forcible compression under the air pump or otherwise? A. Each fluid has its own coefficient of reduction or expansion under changes of pressure.

(2221) O. O. asks: How is it that telegraph lines make a musical sound when there is no perceptible breeze blowing? A. There seem to be particular directions and strengths of wind that correspond with the natural vibration period of the wires. A strong wind out of accord may have little effect, where a slight wind in accord has a powerful effect.

(2222) A. W. G. asks: 1. A current of electricity is said to flow, always, from the positive to the negative pole when they are connected by a conductor. If this is correct, how, in working a differential duplex, with the positive pole of the battery to the ground and the negative to the line, can the current divide at the relay so as to pass through both coils? A. A current always divides in a branched circuit in proportion to the conductivity of the different branches. 2. What is meant by "counter electromotive force," spoken of in connection with electric light circuits? A. Counter electromotive force in arc light circuits is due to polarization in the lamps. It is a current which opposes the direct current by which the arc is produced.

(2223) J. B. asks (1) for the formula to apply to the tin in making tin types. The formula and process of developing and finishing. A. The plate is coated with a collodion made as follows, but which can be bought at photo dealers ready made:

Collodion. Alcohol and ether equal parts, gun cotton sufficient to make moderately thick film, say 5 or 6 grains to the ounce, put the cotton in the ether first, when it is well saturated pour in the alcohol, to which add:

Iodide of ammonium... 4 grs. to the oz. Iodide of cadmium... 2 " " " Bromide of cadmium... 1 " " " Bromide of copper... 1 " " "

There are 8 grains of salt to the ounce. When the collodion has set, the plate is immersed in a silver bath, made by dissolving 50 grains of nitrate of silver in 1 ounce of distilled water, and kept there from 2 to 5 minutes. It is then put into a plate holder, exposed for 29 seconds in the camera, and developed with the following:

Developer. Water... 64 oz. Protosulphate of iron... 4 " Acetic acid... 4 " Alcoholic solution of tannin, ten grains to the ounce... 4 "

The acid and tannin solutions should be added after iron has been dissolved. The developer has to be flowed over the plate with one sweep. The picture is fixed by putting the plate into

Cyanide of potassium... 2 oz. Water... 64 "

Then washed and dried. We obtain the above particulars from "Photography in the Studio," by E. M. Eastbrook. 2. Will the diaphragm in the telephone in the December number work better to be of larger diameter? A. No.

(2224) H. R. N. writes: I have made simple electric motor described in SUPPLEMENT, No. 641. It runs finely when connected as a shunt machine on Edison current of 110 volts. 1. Can I run it with the caustic potash battery described on page 408 of "Experimental Science"? A. You can run your motor with the caustic potash battery, but it will require about 20 cells connected, 5 in parallel, and 4 in series. 2. How many cells and what size should they be to run a boat 15 feet long, 3 feet broad? I have motor wound with No. 20 wire, 100 feet on each magnet coil. A. For running a boat you would require a more compact battery. Better use a plunging bichromate battery of 6 to 8 cells, with carbon and zinc plates 6x8 inches. 3. What size propeller will I need to run the boat at a fair speed? A. You would require a two-bladed propeller 8 inches in diameter.

(2225) R. A. writes: 1. I should like to know why they use permanent magnets in the telephone now in general use. A. Permanent magnets are used in telephones to avoid the necessity of a battery, involving expense and trouble. 2. A telephone man told me that it was necessary to have the receivers exactly equal, that is, have the same size coil, core, and tympanum. Is this true, and why? A. It is not true. 3. If brass is made of copper and zinc, does it form a battery when placed in acid and water, and is that the reason it makes a sore on the flesh by decomposing the fluids, and they claim it cures rheumatism? A. It may dissolve, but forms no galvanic couple properly speaking. It makes a sore by the poisonous action of the oxidizing copper. 4. What is German silver? A. An alloy of copper, nickel, and zinc. 5. Are there more amperes given by a number of cells connected in multiple than one cell with an equal surface of carbon and zinc? A. The same current, other things being equal. 6. Is the chemical action of dry batteries the same as others, and why can it be restored by reversing a current through it? A. Yes; almost any battery can be restored more or less as described. 7. I find that in a pair of electric horseshoe magnets, as long as there is a good connection between the two poles by an iron armature, the magnetism remains after the current has ceased. This is only when there is a clean connection. If paper or any non-magnetic metal comes between, it ceases. I have never seen it mentioned in any electrical books.

What and why is it? A. The paper breaks what may be termed the magnetic circuit. 8. How can wood be seasoned? A. By drying. 9. Why do they use an induction coil in the telephone instead of a direct current? I should think it would be unprofitable on account of the resistance. A. To avoid the necessity for heavy lines for conductors.

(2226) A. T. O. writes: 1. I have a solid flame gasfurnace. Is it a good thing to use in heating tool steel for forging and tempering? A. Yes, if the temperature is high enough. 2. What is the caustic potash and iron battery of which I have heard favorable mention lately? A. Negative element iron, positive element zinc, depolarizer oxide of copper, resting on the iron plate, exciting liquid caustic soda, or caustic potash in solution, E. M. F. 07 to 09 volt. Resistance very low, current very constant. 3. A ton of water falling 10 feet will do 20,000 foot pounds of work. Now, I maintain that if it be allowed to do its work by falling through that distance, it is immaterial whether it does it through the medium of an overshot or a turbine wheel, provided friction be left out of account, and, in the case of the overshot, that none of the water be discharged from the buckets until it reaches the lower level. Am I right? A. It is immaterial. On the whole perhaps the overshot type of wheel has given the highest efficiency, though turbines have in some instances given about as good results. A loss of from 10 to 30 per cent is to be anticipated.

(2227) L. H. asks: How many gallons of water can be evaporated with a ton of coal? Does salt water evaporate as fast as fresh, under similar conditions, and if not, explain difference? What is the best known process for evaporating water for making salt where coal is used as a fuel, and where can I get information as to the cost of same? A. The evaporation power of a ton of bituminous coal is equal to about 3,000 gallons of water in open pans, with economical firing. As saturated brine boils at 227° Fah., instead of 212° for fresh water, the evaporation effect of a ton of coal will be somewhat less for making salt. By the regenerative process of utilizing the heat of the vapor of evaporation for heating and concentrating the incoming brine, it is claimed that a much greater evaporation effect is produced per pound of coal, a possibility of nearly 15 pounds of water per pound of coal. By addressing the Secretaries of State of New York and Michigan you may obtain the reports on the salt industry of these States.

(2228) W. D. M. asks: 1. What is the E. M. F. of Fuller's battery? A. About 2 volts. 2. How long will 10 or 12 Fullers run, using them about four to six hours a day? A. It depends on the amount of work done. Probably 4 or 5 days. 3. How many 2 quart Bunsen battery cells will it take to run the simple electric motor, and how many days will they run the motor at six hours a day? A. It will take 12 cells, connected 6 in parallel and 2 in series. 4. Will wrought iron do to wind the field magnet on? A. Yes. 5. Can I use wrought iron for the core of the armature? A. It is not as good as the wire. 6. Can I use insulated iron wire No. 19 to wind the core of the armature? A. Yes. 7. What number of wire should be used for the winding of armature and field magnet? A. No. 18. 8. How many revolutions will it make a minute? A. About 2,500. 9. What fraction of a horse power is it? A. One-eighth to one-tenth.

(2229) J. B. P. asks: Why does a tree grow round and not square or any other shape? A. There is nothing in nature on the square, except the forms of some crystalline minerals. A circle is the shortest way around, and as trees grow from a common center, a circle becomes a natural sequence in their outward form.

(2230) E. H. asks: Is there any agent known which will restore the ductility of sheet iron, which has been annealed, otherwise than rolling? A. Rolling or hammering is the only way of hardening zinc. Its toughness cannot be restored except by rolling at the proper temperature.

(2231) O. P. asks for a rule to find the horse power to hoist a given load from a coal shaft in a given time. Say 2,500 pounds 400 feet in one minute. A. Multiply the load in pounds by the height in feet per minute and divide the product by 33,000. Thus: 2500x400 / 33000 = 30 horse power, to which must be added the friction of engine and hoisting gear.

(2232) G. W. T. asks: What is the difference in amount of yearly evaporation between one acre of grass land, one acre of plowed land, and one acre of water? A. The difference between the amount of evaporation on water, plowed land, and grass is very uncertain, depending upon the supply of water in the soil, a dry soil evaporating much less than a wet soil under plowed ground. On the average, evaporation on water is greatest, amounting to about 0.8 of a pound per square foot per hour at a temperature of 50° in a light breeze. Plowed ground less, and grass more or less, according to condition of soil beneath. The river basins of the northeastern part of the United States and Western Europe evaporate about one-half the total rainfall, while the great basins of the Amazon and the Mississippi evaporate four-fifths of the total rainfall. The entire Nile basin evaporates about 96 per cent of the total rainfall. The evaporation from the whole land surface of the world gives an average of about 75 per cent of the total rainfall upon the land.

(2233) W. E. F.—The bird is the Bohemian waxwing (*Ampelis garrulus* L.) Habitat North America, U. S. "Casually in winter, but sometimes appearing in immense roving flocks south, sometimes to 35°" (Coles); also "Northernly hemisphere, northerly, wandering south in vast troops at irregular periods. In America, south, regularly in winter to the northern tier of States, in the Rocky Mountains much further, casually to about 35°. Rare on the Pacific coast except in Alaska. Breeds in high latitudes, but down to the United States border in the Rocky Mountains nests in trees or bushes in the crotch of a bough or saddled on a limb" (Coles). Eggs larger than those of the cedar waxwing. Your other queries will be answered later.

(2234) C. H. V. asks: What will make linen paper soft and limber, other than by immersion in weak sulphuric acid bath? A. Boiling water tends to produce the desired effect; caustic alkali in solution or a strong solution of chloride of zinc may be tried. It is not easy to suggest anything that will effect the purpose without injury to the fiber.

TO INVENTORS.

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

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May 6, 1890,

AND EACH BEARING THAT DATE.

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