geometrical definitions, even those which have been accepted by generations of geometricians, are often weak, if not absolutely incorrect.

TREATISE ON PATENT ESTATE. By Thos. B. Hall. Cleveland: Ingham, Clarke & Co. 1888. Pp. 240. Price $3.

Although many manuals of patent law have lately been issued, yet in the little work before us a somewhat different treatment is accorded the subject than that which is usually given it in manuals. The author's plan is characterized by a desire to place the subject on a logical basis. The objects of the patent system and the incorporeal nature of patent rights are first considered as a basis for the work. The property rights of patents, profits, partition, and part ownership are all considered in considerable detail. The action for infringement by one part owner against another is the subject of a separate chapter, and the interesting subject is excellently presented. The propositions throughout the work are based on court decisions, and sometimes much of the text is made up of quotations therefrom. This gives the book its standard character, and removes from it the emasculating atmosphere that is apt to be created by the study of mere manuals, from which verbal citations of decisions are excluded. The book bas a good table of contents and a full index.

TURNING LATHES. Edited by James Lukin, B.A. London: E. & F. N. Spon. 1888. Pp. vi, 160. Price $1.

This book is an illustrated treatise on lathe work, designed for use in technical schools. The minuteness and practical nature of the directions given, however, make it of value to amateur turners. To those wishing to learn the art from the beginning, it would be hard to recommend a more useful book. Wood and metal turning are both considered, and the description of hand turning is especially full.

The Cosmopolitan Magazine of New York City in its May issue introduced a decided novelty in the way of illustration, consisting of four pages of beautifully colored pictures in embellishment of Moncure D. Conway's rather recondite article on "The Pedigree of the Devil." The general contents of the magazine, besides, are above the average of those of most of the similar monthly publications, and well calculated to make the *Cosmopolitan* a popular favorite. The subscription price is $2 a year.

Ferns and Wild Flowers of the Rocky Mountain Region, pressed and well mounted for preservation, are now being furnished by Mr. P. J. Atkinson, of Colorado Springs, Col. They are bound in books varying in size from 3¼ by 4¼ inches to the standard botanical size of 11½ by 16½ inches, the prices for which range from 50 cents to $10 each set. Some specimens we have seen were very beautiful, and the skill and good taste exhibited in their arrangement and presentation left nothing to be desired. Persons making collections of pressed flowers, leaves, ferns, etc., will derive good information from consulting Mr. Atkinson's collection of Rocky Mountain specimens.

☞ Any of the above books may be purchased through this office. Send for new catalogue just published. Address MUNN & Co., 361 Broadway, New York.

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.

(1) F. J. R. writes: I am making an induction coil 3 x 1½ inches, and would like to know what sizes of wire I should use, also whether a bundle of iron wires is very much better than a solid iron core? A. For primary use two layers No. 20 wire, and fill up with No. 34 wire for secondary. The "bundle" core is far the best.

(2) O. K. writes: I have constructed a simple electric motor, as described in SCIENTIFIC AMERICAN, March 17, 1888, and connected it with an Edison light circuit, and it melts the brushes. A. You should reduce the current by introducing resistance, or what is better, place it in a shunt. By a little experiment you will soon arrive at the proper resistance.

(3) J. C. H.—Surface tension or the attraction of cohesion is the principal reason why mercury does not distribute itself all along the tubes when thermometers are laid horizontally. In many thermometers that have large tubes the mercury will separate by turning them bottom end up, and in a few the tube will fill solid by overturning. Mercury expands in bulk as 1 to 1·0154 when the temperature varies from 32° to 212° Fah. Alcohol 1 to 1·11. The expansion of the solid metals is usually expressed as linear; a rod of iron 100 feet long will expand 0·00326 in. for each degree Fah. of rise in temperature, and for a rod 100 feet long of the following metals, the expansion for each degree Fah. will be:

Gold	0·0101 in.	Silver	0·0127 in.
Copper	0·0115 in.	Brass	0·0125 in.
Lead	0·019 in.	Zinc	0·0207 in.
Tin	0·0145 in.	Platinum	0·00571 in.

(4) W. McD. writes: 1. In reference to the construction of the simple electric motor, could not insulated wire be substituted for the shellac-covered wire used in armature? A. Cotton-covered magnet wire is recommended in the article referred to. The shellac insures a more perfect insulation, and at the same time serves to cement the different layers of wire together. 2. What portions of the field magnet correspond to the north and south poles? A. The poles are above and below the center of the armature. 3. Is it possible to make a dynamo to run the motor? If so, would its construction differ in any way from the construction of the motor? If so, what would be the changes? A. A motor can be operated by a current from the dynamo. The dynamo could be made upon the same plan as the motor by using a cast iron field magnet and winding the armature with finer wire, say No. 20. 4. Could the efficiency of the motor be increased by using finer wire? A. It depends upon the quality of the current used for running the motor. For a current of high voltage you should use finer wire. 5. Would not the dynamo be a much cheaper source of the electricity than the batteries, provided you have the power to run it (the dynamo)? A. The dynamo is a cheaper source of electricity than batteries. 6. Is it necessary to charge the field magnet of a dynamo when first constructed, or is there enough residual electricity in the iron to start the current? A. Ordinarily, there is enough magnetism resident in the cores of the field magnet to start the current, but it sometimes happens that it is necessary to supply the magnetism from an outside current. 7. I wish to have my pupils construct an electric motor of say ¼ horse power, also a dynamo to run it. We have the appliances of an ordinary machine shop to aid us. Have you ever published, or intend to publish soon, the details of construction of such a motor and dynamo? If not, where can I find such a description? A. In SUPPLEMENT, No. 600, you will find a description of a small dynamo which would also serve as a motor. 8. Have you ever published anything regarding the construction of an electric lamp (arc)? A. You will find in the back numbers of the SUPPLEMENT, descriptions of many forms of arc lamps. See our SUPPLEMENT catalogue and SUPPLEMENT, No. 652. We can also supply Arc and Globe Lamps, by Maier, $3.

(5) C. A. L. asks how to make and put up a mechanical telephone good for a distance of a quarter of a mile. A. For an acoustic telephone use small twisted wire cable picture cord. Stretch it between two disks of thin tin or steel in thickness about No. 34 wire gauge. Disks to be 3 inches diameter, fastened with screws between two pieces of hard wood, so made as to pinch the disks all around. The wire to be fastened to the center of the disks by a loop through a soldered eye. The wire may rest in slings of rubber or leather attached to poles about 150 feet apart. The wire should not turn sharp corners. The disks should be set square with the wire at convenient positions to maintain a strong tension upon the wire, as well as convenient for conversation.

(6) J. C. writes: I am making an induction coil on the general principles of one described in SUPPLEMENT, No. 569. Primary coil is finished, and works very well, but I would like to have a little information. Primary coil has on it four coils of No. 24 wire. Paper tube for secondary coil measures 1½ inches outside. Must I use No. 36 wire, or will No. 32, or even heavier, wire answer the purpose? How many layers will be required, keeping in view the fact that I do not want to get it more than 3 inches in diameter, if possible, and what will be approximate weight of wire? A. There is an advantage in using fine wire in the secondary coil, as the entire body wire will be nearer the metallic core. We think you have made a mistake in making your core and primary coil of such large diameter. You should have from 15 to 20 layers of the secondary wire.

(7) Ph. L. S. asks: How is soluble Prussian blue prepared? A. Add a solution of ferrous sulphate to a solution of potassium ferrocyanide, and expose the precipitate to the air till it becomes blue, and wash it till all the soluble salts are washed away. By continuing the washing, the blue itself dissolves, forming a deep blue solution that may be evaporated without decomposition. 2. How is ink prepared that writes blue and then turns black? A. See the formulas given in SCIENTIFIC AMERICAN SUPPLEMENT, No. 157. 3. How long will quicklime take to dissolve bones, and is the dry or slaked lime the most active? A. Place the bones in a large kettle filled with ashes, and about one peck of lime to a barrel of bones. Cover with water and boil. In twenty-four hours all the bones, with the exception perhaps of the hard shin bones, will become so much softened as to be easily pulverized by hand.

(8) W. M. M. asks the best kind of paint to use on a tin roof, something that will stop leaks as well as preserve the tin. A. Use Prince's metallic paint, or any ground oxide of iron, mixed with linseed oil.

(9) C. R. M. asks a good cement for leather belting. A. Take of common glue and isinglass equal parts, soaked for ten hours in just enough water to cover them. Bring gradually to a boiling heat and add pure tannin until the whole becomes ropy or appears like the white of eggs. Buff off the surfaces to be joined, apply this cement warm, and clamp firmly.

(10) T. S. A. desires (1) a good recipe for lemon sugar, one that will not taste too much of the sugar, and be insipid. A. Citric acid 1 ounce, white sugar 2 pounds, essence of lemon ¼ ounce; powder and keep dry for use. One dessertspoonful will make a glass of lemonade. 2. A recipe for old fashioned ginger pop beer. A. See the recipes given in SCIENTIFIC AMERICAN SUPPLEMENT, No. 270, under the title of "Effervescing Beverages."

(11) G. A. D. writes: In the West a great deal of grain is bound with twine made from manila. Has there ever been any effort made to manufacture binder twine from flax, and what success has it had? Is flax twine any more apt to be "cut" by insects than manila twine? How should twine be treated to prevent insects from gnawing off the bands? A. Binder twine was made from flax in the early days of the reaper. The manila twine is the cheapest. Flax is not affected by insects, to our knowledge. Saturating the twine with salt brine will keep insects from cutting it.

(12) C. E. L. asks: What will drive out large black ants from a pantry? A. Red pepper, sulphur, kerosene, carbolic acid, and similar substances are efficacious in driving ants away.

(13) O. R. R. writes: 1. There is a notion prevalent in this vicinity that, in order to have good well water, the well must be open so as to expose the water to the air, and also that some way of raising the water which agitates it is to be preferre . How much truth is there in the above? A. Agitation and exposure to the air is valuable as a means of destroying organic matter in water. 2. What is the reason that dynamite will explode by percussion, but not by fire? Would a very hot iron cause it to explode? A. It is often impossible to assign a reason for chemical facts. A sudden heat applied to the whole mass might cause an explosion, while the local application would fail.

(14) F. G. asks how to drill by hand a one-half or three-fourths inch hole through a plate of glass one-fourth of an inch thick, for a Wimshurst electrical influence machine. The glass disks are eighteen inches in diameter, and each is to carry sixteen sectors. A. Clamp over the glass disk a board having in it a thirteen-sixteenths inch round hole, the hole to be arranged exactly over the center of the disk. On a brass or copper tube six or eight inches long, and ¾ inch in diameter, secure a spool about 2 inches in diameter, and in the top of the tube insert a hard wood handle having a shoulder which will bear upon the top of the tube. Provide a long bow with strong catgut cord, and operate the tube like a bow drill. Keep the hole in the board supplied with coarse emery and water.

(15) G. E. T. asks: Can you give general proportions for increasing the capacity of the dynamo machine described in SUPPLEMENT to 24 or 32 16 candle power lamps? Does it make any material difference whether the rings of the armature are cast or wrought? How should the machine be mounted? A. If you increase the dimensions one-half (linear), the dynamo will run from 24 to 30 lights. The rings of the armatures should be of wrought iron. The machine should be mounted upon a frame so as to be adjustable, for the purpose of tightening the belt. The belt should be seamless.

(16) G. W. G. asks: What will destroy roaches or drive them away? A. Use fresh borax and Persian insect powder continuously until the pests are exterminated. Or use a phosphoric paste, of which there are several kinds to be had at drug stores. It should be mixed with a little molasses, and put on bits of cardboard or paper, distributed around infested places. The practice should be kept up some time after the pests have apparently disappeared, on account of young ones coming out, say for three or four weeks.

(17) W. C. T. asks if common putty, such as used to put in window glasses, could be used to make the porous cup of a galvanic battery. If not, what is a good way to make one? A. Putty is useless. Make it of clay or use a flower pot with the hole in its bottom corked up.

(18) N. P. K. asks how to polish black marble. A. The process embraces five stages, beginning with the use of coarse materials and finishing with dry rags. A full description of it is given in Spons' "Workshop Receipts," first series, in an article entitled "Marble Working." We can supply the book for $2.

(19) C. S. asks: What will stick celluloid to paper, wood, glass, etc.? A. Try the following: Gum shellac 1 ounce, camphor 1 ounce, alcohol 4 ounces. Dissolve and filter.

(20) C. S. W. asks a recipe for making compressed yeast, also called German yeast. A. It is obtained by straining the common yeast in breweries and distilleries, until a moist mass is obtained, which is then placed in hair bags, and the rest of the water pressed out until the mass is nearly dry.

(21) J. H. N. asks how to make a varnish of bleached shellac to be used in the place of the common shellac dissolved in alcohol. A. Break the gum in small pieces, and macerate in a stoppered bottle with ether; after swelling up sufficiently the excess of ether is poured off, and it will readily dissolve in alcohol.

(22) R. C. asks (1) the proper name to apply to a person who makes insects a study. A. Entomologist. 2. A recipe for an effective insect powder. A. See "Two Valuable Insecticides," contained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 218. Powdered sulphur is likewise efficacious in many instances.

(23) A. H. T. asks: 1. What chemical action takes place when milk sours, and why? A. The milk sugar which it contains decomposes into lactic acid. This process is known as lactic fermentation. See the article on fermentation in any cyclopedia. 2. How to prevent milk from souring. A. Milk is best preserved by the addition of a few grains of bicarbonate of soda or potash, and placing in a tightly corked bottle.

(24) N. A. E. asks how to make rose perfume or rose water. A. Dissolve attar of roses, 6 drachms avoirdupois, in strongest alcohol hot, 1 imperial pint; throw the solution into a 12 gallon carboy, and add 10 gallons pure distilled water at 180°–185° Fah. At once cork the carboy, at first loosely, and agitate the whole briskly, although at first cautiously, till quite cold. See also "Rose Oil or Otto of Roses" in SCIENTIFIC AMERICAN SUPPLEMENT, No. 275. We can also supply you with the Manufacture of Perfumes, by Snively. Price $3.

(25) L. L. U. asks: How much coal will it take to melt 3,000 pounds of light scrap iron in a cupola 20 inches diameter? A. From 700 to 1,000 pounds anthracite.

(26) A. F. M. desires a receipt for taking the rust off drawing instruments without injuring them. A. Mix 10 parts of tin putty, 8 of prepared buck's horn, and 25 of spirits of wine, to a paste. Cleanse the articles with this, and finally rub with soft blotting paper.

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June 12, 1888,

AND EACH BEARING THAT DATE.

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