he makes an earnest plea for assistance to be given to investigators in these lines. Our readers are already familiar with some of this class of work, from our description of Professor Pickering's work at the Harvard College observatory, and considerable space is given to the results of the Henry Draper memorial investigations in the book before us. The illustrations include solar and stellar studies, plates of spectra, and representations of lunar photographs. Some terrestrial views of the scenes in the mountains where the tireless observers were at work give a graphic idea of the hardships of the astronomer's field life. The paper is heavy, the margins are wide, and with its ornamental binding the book presents a most attractive appearance, and one quite in consonance with the holiday season.

CATALOGUE OF PRACTICAL AND SCIENTIFIC BOOKS. Published by Henry Carey Baird & Co., 810 Walnut Street, Philadelphia, Pa., U. S. A.

We have received a copy of the above catalogue, which is devoted to the publications of this well known house. Space does not permit us to more than hint at its contents. It comprises a large assortment of standard works on technical subjects, and the principal works have a synopsis of the contents given, so that a buyer can order safely from the catalogue, knowing in advance whether what he is buying will be likely to suit his requirements. An "Index to Subjects" is a distinguishing feature that enhances the value of the catalogue. It is sent free of postage to all wishing it.

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 This is for our information, and not for publication.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.

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Minerals sent for examination should be distinctly marked or labeled.

(1) N. B. D. asks: 1. How many gear wheels would make a good set for ordinary use on a small Barnes lathe, which I wish to convert from a hand feed to an automatic screw-cutting feed? How many teeth should the several wheels contain? A. For a small lathe for amateur work the screw should be 10 threads to an inch. If the screw has a left hand thread, it will require a 4 gear train. If a right hand thread, it will require a 5 gear train. The left hand screw and 5 gear train gives the best control of the distance between the centers of spindle and screw. The change can be made movable on a radius bar to accommodate the varying distance made by the different sizes of thread gear. The teeth should be about three-sixteenths inch pitch. The spindle, change gear, and inside stud gear may be 36 teeth. Then for outside stud gear and screw gear for—

	Stud gear.	Screw gear.
10 threads.	32	32 teeth.
12 "	40	48
14 "	40	56
16 "	20	32
18 "	20	36
20 "	20	40
22 "	20	44
24 "	20	48
26 "	20	52
28 "	20	56
30 "	20	60

2. Which would be the most economical and practical form of rotary engine—one of large diameter and short through shaft, or small diameter and greater length? Would not the first develop greater power at slower speed? Theoretically, the rotary engine would seem to be the best form of steam motor, as there are no dead centers and motion is continuous in one direction. Since steam can also be used expansively in this form of engine, what are the objections that prevent its more general use? A. No form of rotary engine has as yet been found to be economical when the factors of wear and waste of steam are considered. This is probably the secret of their scarcity in the list of steam engines on the market for practical and durable work. The large diameter rotary has narrow disks sweeping over large surfaces that are difficult to adjust to prevent leakage. The small diameter rotaries are the class that have mostly been adopted by builders of such engines.

(2) J. A. asks how he can make a magnet exert its magnetic attraction through 6 inches of metal—alternate layers of steel (hardened) and iron. A. This is practically impossible. The mass of iron distributes the magnetism so as to act as a magnetic shield.

(3) S. M. L.—The springs of steam gauges are made of seamless tubing flattened by drawing over a flat mandrel, and bent to the proper form after being filled with resin or fusible metal, the filling melted out, and the springs then burnished. They are generally made of an alloy of copper 1 pound, tin 1 ounce, zinc 4 ounces. Very small gauges have been made for special purposes, having springs 1⅛ to 2 inches diameter.

(4) J. B. asks a cure or, at least, a relief for chilblains. A. Dissolve 1 ounce ammonium chloride in ½ pint cider vinegar, and apply frequently: ½ pint alcohol may be added to this lotion with good effect.

(5) W. B. desires a receipt for making blackboard. A. Take ½ gallon shellac varnish, 5 ounces lampblack, 3 ounces powdered iron ore or emery. If too thick, thin with alcohol. Give three coats of the composition, allowing each to dry before putting on the next. The first may be of shellac and lampblack only. The Harvard liquid slating sold by paint houses is likewise an excellent preparation for this purpose.

(6) C. W. F. asks: 1. How can I make a good sticky fly paper? A. In a tin vessel melt together 1 pound resin and add 2 fluid drachms of linseed oil. While the mixture is warm dip a spatula into it and spread what adheres to the blade on foolscap paper. Different samples of resin require varying proportions of oil to make it spread properly. 2. What cement can I use to glue brass or steel to a thickly painted surface? A. No cement will make such a joint. 3. I have quite a quantity of tar, used for making gravel roofs. What can I mix it with to make a paint for shingles? A. Use coal tar benzol to dissolve or thin the tar.

(7) E. A. J. asks (1) how to make a strong parchment paper. A. Mix dilute strong sulphuric acid with ½ its volume of water and allow it to cool to about 65° Fah. Then immerse unsized paper in the cold acid for 10 to 50 seconds, according to its thickness. The paper is then well washed in cold running water, and dipped in dilute ammonia, again washed in water and finally dried. 2. How to make a good and cheap roofing paint—practically fire and water proof. A. Use the formula given in SCIENTIFIC AMERICAN SUPPLEMENT, No. 113, under "Recipe for Roofing Paints."

(8) E. T. S. asks: 1. How can I give pine wood an ebony finish? A. Use the following: Dissolve 4 ounces shellac with 2 ounces borax in ½ gallon water. Boil until a perfect solution is obtained, then add ½ ounce glycerine, after which add sufficient aniline black (soluble in water), and it is ready for use. 2. How to crystallize glass so that it will not wash off. I have used salts and sour beer, but the least moisture destroys it. A. After you have allowed your salts to crystallize, thin-coat the glass with a light coat of varnish. Otherwise you must use the sand blast or some permanent method. 3. How to transfer any lithograph or printed picture of any kind on glass, so that it will be visible from both sides, and will last a long time? A. The process consists essentially in giving the warmed glass an even coating of balsam or negative varnish. Place the face of the print on the surface thus prepared, when the varnish is partly dry, but still tacky. Smooth it out and let it stand in a cool place until the varnish sets. Then apply water, and with a soft piece of gum rubber, or the finger tips, rub off the paper so as to leave the image on the varnished glass.

(9) C. P. S. asks (1) the point at which gasoline becomes a vapor or gas so that it can be burned. A. Gasoline is inflammable at the ordinary temperature, and can be burned. In using this as a gas, it is generally the habit to force air through a convenient vessel filled with shavings, saturated with gasoline, and as it comes out it may be ignited. 2. Can kerosene be burned as a gas? That is, what temperature must be applied? If it will form a gas in this way, is there any residue left in the tank? A. Kerosene has a burning point of 100° Fah., or upward, according to its quality. If properly burned, there will be no residue except carbon, same as in gas.

(10) W. S. desires a recipe for the padding glue so commonly used by printers throughout the country. A. Use a cheap glue, with five per cent glycerine, made into a mixture with any suitable coloring material. Some use ordinary rubber cement, made by dissolving rubber in carbon disulphide.

(11) A. G. M. asks how to clean kid gloves. A. Provide a tall glass cylinder, in the bottom of which place strong aqua ammonia. Be careful to remove from the sides of the jar any ammonia that may have been spattered upon them. Suspend the gloves to the stopper of the jar and allow them to remain for a day in the atmosphere of ammonia. They must not come in contact with the liquid. Rubbing with bread crumbs, in connection with the above, or without the use of ammonia, is also much practiced.

(12) L. S. C. asks the formula used in making oil coats (the light yellow ones worn by teamsters). A. As far as we can learn, the process consists simply in dipping the articles into boiled linseed oil. An excellent receipt is boiled oil 15 pounds, beeswax 1 pound, ground litharge 13 pounds. Mix and apply with a brush to the article, previously stretched against a wall or a table, first well washing and drying each article before applying the composition.

(13) H. G. H asks for information on the following points concerning the construction of an induction coil, similar to the one described in SUPPLEMENT, No. 160, but 16 inches in length. What size of wire should be used for the primary coil? How many thicknesses of varnished paper should be placed between the layers of the secondary coil, the layers being wrapped entirely across the coil? A condenser of how many square feet should be used? How many cells bichromate of potash battery will best operate the coil? How long sparks ought such a coil to give? A. Use the same wire as specified in the article in SUPPLEMENT, No. 160, for a 16 inch induction coil. Put 60 to 80 square feet of tin foil in the condenser. Do not wind the wire all the way across the coil, but divide in four or more divisions. Use four or six bichromate cells. You should get 3 inch sparks.

(14) S. J. S. asks (1) a receipt for a dead black paint for photo. use and inside of optical instruments. A. For a dead black for inside of tubes use lampblack or artists' boneblack mixed with alcohol in which a few drops of shellac varnish have been mixed. No more shellac than will just make the black stick. Make a trial on a piece of metal. If, on drying, it shows the least shining surface, there is too much shellac. If, on the contrary, the black readily rubs off with the fingers, there is not enough shellac. A drop of shellac varnish to a tablespoonful of the mixture may change its drying character to a shining or a dead surface. As but a very small quantity of the blacking is needed for an instrument, we cannot readily give the precise quantity. 2. Can a wooden tray be coated with rubber so as to resist acids (chemicals used in photography)? If so, how? A. A wooden tray can be coated with rubber varnish and dried in an oven. We recommend paraffine as more suitable for chemicals. Warm the tray and send the paraffine well into the wood with a warm iron.

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