NEW BOOKS AND PUBLICATIONS.

AROUND THE WORLD WITH GENERAL GRANT. By John Russell Young. New York: Subscription Book Department of the Americau News Company. Published in 20 parts. Each 68 pp. 8vo. Illustrated. 50 cents.

Parts I. and II. of this splendid record of travel cover the experiences of General Grant in England. No traveler was ever received with so much distinction by the leaders of thought and action the world over, or ever saw, under more favorable conditions, the best that the civilized world has to offer. The narrative of his journey is cleverly told and lavishly illustrated; and, so far as published, amply fulfills the promise of the publishers to make it the finest record yet printed of a tour of the world. With such a wealth of superior material to choose from Mr. Young could scarcely fail to make an interesting volume; his skill and experience as a journalist left no doubt of his making good use of his opportunities. It is not likely that any other writer will ever have a story to tell involving so many brilliant scenes or containing so much to gratify American pride.

BIRDS OF THE COLORADO VALLEY. By Elliott Coues. Part First, Passeres to Laniidæ. Washington: Government Printing Office.

It is rare that a book, more especially an official document, is so much more than it professes to be as this admirable report of Dr. Coues. The value of the bibliographical appendix it is impossible to overestimate. The whole subject of the bibliography of North American ornithology and of the synonomy of North American birds has been worked up anew from the very beginning, every point being verified by personal investigation. It is by far the best work ever done in this department.

THE ART INTERCHANGE. Volume II. January to June, 1879. New York: The Art Interchange Publishing Company. Price $1.50 a year.

This unpretending but sensible and admirably edited household journal deserves the cordial support of every one who cares for the promotion of the polite arts. It is not only an art newspaper of a fine and discriminating character, but a periodical instruction book giving theoretical and practical lessons in art methods, which will be found of value in every refined household. It is published fortnightly, and each number has twelve pages, with an occasional illustrated supplement.

ORGANIC CHEMISTRY, PRACTICAL AND THEORETICAL. By Hugh Clements. London: Blackie & Son, 16mo, cl., pp. 283.

Specially designed for the students in the Science and Art Department, South Kensington. The descriptive portion appeared originally in a series of articles in the *English Mechanic*, to which has been added some fifty pages on the identification of organic substances, a short chapter on fixed and essential oils, a brief description of apparatus used in this department of chemistry, a list of practical questions and exercises, and eighty or more pages of papers set in organic chemistry at the Kensington examinations (with answers) for the ten years ending 1878.

Notes & Queries

HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of 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 a reasonable time should repeat them.

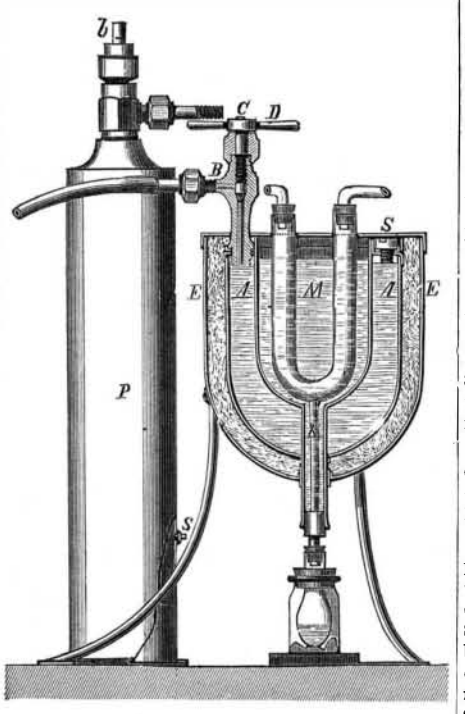
Persons desiring special information which is purely of a personal character, and not of general interest, should remit from $1 to $5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at this office. Price 10 cents each.

(1) S. S. H. asks: 1. What effect would the explosion of one pound of dynamite, 40 fathoms beneath the surface, have upon the larger fish in the immediate neighborhood? A. Those within the immediate vicinity of the explosion would be killed through the rupture of the air bladder and intestines; they would sink at once to the bottom. Those at a distance would be simply stunned, and would rise to the surface after a time. 2. If the effect is destructive, what would be the probable diameter of the circle of death? A. Perhaps within a radius of 50 yards. 3. Measuring from the surface, to what depth would the concussion be sensibly felt? A. The shock of the explosion would be felt most severely downwards—it is difficult to estimate. The disturbance would reach the surface, but the concussion there would be comparatively slight. 4. Do fish caught in this way become unfit for food; if so, in what way? A. No.

(2) D. H. H. writes: 1. I have been getting up a collection of entomological specimens for the past 3 or 4 years, and I have found that my specimens are eaten by a small grub which spoils a great many of them. I think they must generate in the specimens, as some of them are not exposed to the air. Will you please inform me what I can put on the insect that will prevent these moths hatching and not injure the specimen? Would corrosive sublimate do to paint them with? A. Impregnate the specimens with a solution of arsenious acid in dilute alcohol. See p. 11 (40), volume 38, SCIENTIFIC AMERICAN. 2. Will equal parts of alcohol and water preserve zoological specimens as well as pure alcohol? A. No. 3. Will you please inform me also what is the latest illustrated work published on American insects and reptiles suitable to classify and study up entomological and zoological specimens? A. Consult Packard's "Guide to the Study of Insects," Westwood's "Thesaurus Entomologicus Oxoniensis," Nicholson's Zoology, and Owen's "Vertebrate Animals."

(3) G. M. asks how methyl chloride can be used in the production of ice. A. Methyl chloride, which is used in the manufacture of green and violet aniline colors, was employed for this purpose some years since by Raoul Pictet, and lately Mr. Camille Vincent, of Paris, has used it to produce very low temperature. If compressed methyl chloride is liberated from this over-pressure it will begin to boil, and the temperature will fall to −8° Fah. This boiling will then stop, and the fluid methyl chloride will remain quiet without evaporating any further. By means of an air pump the temperature can be reduced to −67°. The small machine that Mr. Vincent uses for this purpose consists of a double walled copper vessel, between which two walls the methyl chloride enters at A. The space, M, contains some non-congealable liquid—alcohol, for instance. The space, E, is filled with some non-conductor of heat, as mineral



wax, etc. B is a stopcock which is opened and closed by turning D. P is a wrought iron receptacle containing the fluid methyl chloride. In order to conduct the methyl chloride into A, the side opening of the receptacle is connected with the rubber hose that is attached to B, the receptacle is raised and its stopcock is opened. That part of the methyl chloride that evaporates escapes through the opening, S. As soon as the temperature has fallen to −8° (the boiling point of methyl chloride), the opening, S, is closed. If it is desired to lower the temperature to −67°, an air pump must be attached to B. In this way a quart of alcohol can be kept at a temperature of −67° for several hours.

(4) U. R. N. G. writes: I have about $5 gold (pure) dissolved in hydrochloric acid; after acid is dried on fire, the gold is redissolved in solution of bichromate potassium. Do you think it is ready for gilding in electrotype battery? My battery is bichromate potassium and sulphuric acid for carbon, and weak sulphuric acid for zinc. The matter for gilding is hung on the zinc by a copper wire, and the gold is hung on the carbon by a copper wire. Will that do? If not, how is that done? A. Purify the gold by fusing it with 10 parts of borax glass in a black-lead or French clay crucible; dissolve it by aid of heat in a mixture of 3 parts hydrochloric and 1 part nitric acids, and evaporate the solution cautiously over a water bath nearly to dryness. Proceed as directed under head of "Electro Gilding," p. 2,540, No. 160, SCIENTIFIC AMERICAN SUPPLEMENT. 2. I have a big gutta percha dish, one corner of which is broken; can you tell me how I can repair it? A. Melt together equal parts of pitch and gutta percha, and add ¼ part of powdered shellac. This should be well stirred together. Use hot, and clamp the parts well together until the cement has hardened. 3. How are electrotypes taken from the gelatine mould? A. It is necessary to take a plaster cast of the gelatine mould. From this a positive cast can readily be obtained.

(5) F. N. L. asks how the bright gold and silver lettering is done on glass. A. The size is prepared by dissolving one ounce isinglass in just enough water to cover it; when dissolved add a pint of rectified wine spirit and make up to a quart with water. Give the clean glass a flowing coat of this, and carefully lay on the leaf, which will then readily adhere to the glass. Let it remain 24 hours to dry. The design or letter is drawn on paper, and the lines pricked with needle holes. Place this against the gilded surface and dust it thoroughly with powdered whiting. When the paper is removed there will remain a correct copy of the design or letter on the gold. Now fill up the outline with oil gold size in which has been ground some orange chrome, thinned somewhat with boiled oil and turpentine. When this has thoroughly dried wash off the surplus gold with water and a piece of cotton wool. Silvering may be done with the leaf, but it is better to use a dry amalgam. See p. 315, Spon's Workshop Receipts.

(6) J. D. M. asks how sperm oil can be divested of its gum and prepared for use on the sewing machine and other delicate machinery. A. Allow the oil to remain in contact with a quantity of lead turnings or clippings for several weeks (usually six weeks is required), then decant and strain through linen or a sand filter. See p. 1670, No. 105, SCIENTIFIC AMERICAN SUPPLEMENT.

(7) F. C. E. asks (1) how to bore a 3x4 inch cylinder for steam engine. A. You can bore it in an ordinary slide lathe, with boring bar and cutter. 2. How to make a permanent deposit of bright silver in desired places which cannot be reached by the hand, on the inner surface of bottles. A. Silver nitrate, 1 ounce; distilled water, 1 pint; strong aqua ammonia, *q. s.*, added gradually to first precipitate, and then redissolve the silver; honey, ¼ ounce. Pour this solution into the bottles, etc., immerse them in water and boil for 10 to 30 minutes, or until properly coated. See article "Silvering Glass," No. 105, SCIENTIFIC AMERICAN SUPPLEMENT. 3. Do most scientists of the present day, who have looked into the subject, believe in phrenology? A. No.

(8) S. E. writes: 1. I wish to turn a block, composed of a number of different kinds of wood; what is best to glue them with? I also wish to glue very thin strips of wood to linen; what is the best glue for the purpose? A. A fine animal glue is as good as anything for these purposes. 2. Where can I get an automatic tide register, and about what would one cost? A. Insert an advertisement in "Business and Personal" column. 3. How many people have obtained American patents? A. See the numbers in patent list on another page.

(9) H. L. B. asks: What size of steam pump would be required to force water through a 3 inch main a distance of 3,000 feet, with 50 feet elevation at end? A. You can use any size of pump you please; it must be determined by the quantity of water you wish to lift in a given time.

(10) H. M. H. asks: 1. What pressure of steam will a boiler stand made like the one described in SUPPLEMENT, No. 182, page 2891? A. If well put together, 150 lbs. per square inch. 2. Where should the water stand in it? A. One to two inches below top of lower flasks

(11) W. M. asks: 1. Will a boiler of 20 inches diameter, 20 inches high, ¼ inch iron, hold 350 lb. of steam to the square inch? A. Make it at least 5-16 inch thick. 2. How thick should the cylinder be, 3½ inch bore, by 6 inch stroke, to make 400 revolutions per minute, boiler pressure 300 lb.? A. ¼ inch when finished.

(12) C. J. B. asks: What is the greatest depth in which any submarine diver has successfully operated? A. We think about 120 feet, at a wreck on Lake Erie.

(13) W. G. R. asks (1) how to make a preparation to dip packages in to give them a coating that will keep them waterproof and airtight, packages covered with brown paper. A. You may try the following: Shellac, 4 parts; borax, 1 part; water, *q. s.*, to form on boiling a very thin sirup. If required to dry very quickly, use hot. Or use a solution of shellac in wood naphtha containing a small quantity of boiled oil. 2. What will make a good cheap washing crystal? How is bluing put in washing crystal, and what kind of blue is used? A. "Washing crystal" is common commercial carbonate of soda, subcarbonate of soda. The bluing is either ultramarine or aniline blue (BB), added during the crystallization. 3. Can you get me a compound analyzed of a vegetable kind and tell me what it contains, and what would be your charge? A. Yes; the cost depends upon the nature of the compound.

(14) W. S. J. asks: 1. Which is the best deep sea sounding apparatus in use? A. That used by the United States Coast Survey. 2. What are its defects? A. This is probably as near perfect as any in use.

(15) W. asks: What acid can be used (if any) in making a monogram type upon copper, to eat away the surplus metal, leaving the letters stand out in relief, and the surface smooth? Please describe the process or give some other good method. A. Use nitric acid diluted with about 3 volumes of water. Cover the portions to remain untouched with paraffine. The sand blast may be advantageously used instead of acid in some cases.

(16) Our correspondent C. N. writes: Is it known what is the actual difference in the amount of fuel required to run a stationary boiler (doing substantially the same work) in winter as against the summer season, caused by the difference in temperature alone? Perhaps some of your readers can give the amount of fuel that was required to run a boiler that was exposed to the weather, for each of the twelve months, doing comparatively the same service. The result of a twelve months' performance of a small portable engine and boiler, used for sawing wood, would be a fair test, as the exposure of it to atmospheric changes would be unquestionable. [Perhaps some of our readers will be able to furnish the information desired by C. N.]

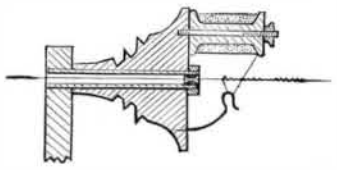
(17) F. B. asks: 1. In the dynamo-electric machine described in SUPPLEMENT 161, can the cores of the electro-magnets be cast of common cast iron, or would that be too hard? A. Soft cast iron will do. 2. How long ought a bichromate battery work without attention? A. It depends on how much is required of it. Ordinarily two weeks. 3. What is vulcanite? A. Hard rubber.

(18) A. M. W. asks: What metallic or non-metallic substance, heated to a red or white heat, will retain that degree of heat longest after it has been removed from within the flame, and which with an occasional use each day will probably sustain the injurious effects of the flame longest without requiring to be replaced? A. Common fire brick will probably answer your purpose best.

(19) R. K. writes: 1. I am about building a screw propeller launch, 25 feet long and 5 feet beam, to be run by an engine with cylinder 2x5 inches. About how many miles an hour, with 150 lb. of steam on, would she run, with a 3-16 inch steel boiler, size 20x35 inches? A. If boat has good model, probably 4½ or 5 miles per hour. 2. Where and at what price could I get a complete description of the electro-magnetic engine? A. The back numbers of the SCIENTIFIC AMERICAN and SUPPLEMENT contain all of the recent information on this subject. 3. What is the cost of running a magnetic engine as compared with a steam engine of the same power? A. The cost of running a magnetic engine is about 50 times as great as steam. 4. About what is the price of a six horse power magnetic engine? A. We think there are no engines in market of that size.

(20) D. L. M. writes: In a fire engine at work, throwing water through 200 feet of hose with an inch nozzle, where is the greatest pressure of water: as it leaves the engine, or at the inch hole at the end of the nozzle? A. At the pump.

(21) J. F.—A simple device for covering wire is shown in the annexed engraving. A ⅜ tube



having a smooth exterior is screwed into a wooden standard, and supports a wooden pulley that carries a spool containing the silk or cotton with which the wire is wrapped. The thread passes from the spool through the small wire guide hook, thence to the wire to be covered, which is drawn slowly through the tube as the pulley revolves. The pulley may be turned by connection with a lathe, or it may be driven by a belt from the driving wheel of a sewing machine. The wire being covered may be drawn through the machine by hand, or a reel may be easily attached and arranged to take motion from the pulley.

(22) W. P. asks: 1. If a sulky or gig is being run around a course or a circle, with a horse hitched to the same, which way will it upset, or which way is it liable to upset: towards the center of ring or the outside? A. Toward the outside. 2. If a locomotive is running around a sharp curve, do not the driving wheels on the inside of curve have to slip on the rail? A. One or both wheels must slip. 3. What will I put on common paper to make impression paper for transferring patterns on wood? A. See p. 283 (23), Vol. 40, of SCIENTIFIC AMERICAN.

(23) F. R. R. writes: 1. In the SCIENTIFIC AMERICAN of August 9, page 91, communication (10), H. W. F. describes a cheap battery. I wish to ask: 1. What is the battery fluid? A. 2 parts of bichromate of potash dissolved in 20 parts of hot water. When cold add 1 part of sulphuric acid. 2. Where can the gas carbon be obtained, and how prepared? A. It is obtained from the retorts of gas works. It may be chipped or sawed into shape, but it is usually pulverized, mixed with soft coal dust, and calcined in iron moulds. Plates of this kind may be had from any dealer in electrical supplies. 3. Can it be made from lampblack? A. No. 4. Is the amalgamated zinc the same as that commonly used in plumbing, roofing, etc.? A. No, it is not as pure as it should be; however, it may answer your purpose.

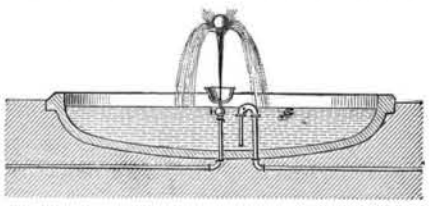
(24) R. W. D. asks: 1. What chemical should I use to saturate paper to be used on a chemical telegraph? A. Nitrate ammonia, 2 lb.; muriate ammonia, 2 lb.; ferri-cyan. potassium, 1 ounce; water, 1 gallon. 2. Also, is there sufficient resistance in above paper to keep current from passing through it? A. No; the current must pass to make the mark. 3. How can I gild iron to resemble brass, inexpensively? A. Clean the iron by scouring, and rub it with sawdust slightly moistened with a dilute acid solution of copper sulphate. Rinse, dry, and lacquer if necessary. 4. What is the resistance of one mile of No. 14 galvanized iron wire? A. 51 ohms.

(25) C. C. H. asks how to arrange connections on a telephonic line having three telephones and using electric alarm bells as calls. A. Use single stroke bells on a closed circuit. Have a switch to throw the bell out, and the telephone into the circuit after the alarm.

(26) C. A., Jr., asks: 1. Is there any particular rule for cutting threads with simple or compound gearing, given only the number of threads in feed screw; if so, what are they? A. $\frac{T}{t}\frac{S}{t'}I = N$; $\frac{t}{I}\frac{t'}{T} = S$. T representing the number of teeth in traverse screw wheel; S number in stud wheel gearing in mandrel; t number in wheel upon mandrel, and t' number in gearing upon stud pinion, gearing in T; I number of threads per inch upon traverse screw; N number to be cut. 2. We have for one engine two horizontal boilers and one steam drum. What is the gain by having a safety valve on each boiler and one on the drum? Why couldn't we do with only the one on the steam drum? A. If there are shut off valves to your boilers, you should, for safety, have a safety valve to each boiler; none is necessary to the drum if the communication to the boilers is free. 3. How do you find the horse power of an engine? A. See p. 267 (4), Vol. 40, SCIENTIFIC AMERICAN.

(27) A. K. asks: What is the greatest altitude yet reached by a railroad? A. Some railway memoranda lately published in Germany give the highest points yet reached by existing railways passing over mountain ranges or through mountain passes. The Apennine line reaches a height of 2,024 feet; the Black Forest line, 2,789 feet; the Semmering, 2,920 feet; the Caucasian line, 3,198 feet; the St. Gothard (tunnel), 3,786 feet; the Brenner, 4,475 feet; Mont Cenis (tunnel), 4,390 feet; the North Pacific, 5,420 feet; the Central Pacific, 7,021 feet; the Union Pacific, 8,573 feet; while a railway over the Andes climbs to 15,646 feet.

(28) J. W. W. writes: I inclose you section of small fountain reservoir, with (I think) a novel automatic siphon. We built two small fountains in a portion of the yard where the inmates have access to them, and fearing the overflow pipe would be tampered with, I put in a siphon overflow as shown in the cut.



It answers two purposes, acting as a positive overflow, and, when it is desirable to clean the basin, the entire body of water can be siphoned out by putting a small wood plug in the air hole at the bend. This device has been working about two months under a variable pressure of water, and the water line never gets above the return elbow, or below the bottom of air hole.

(29) E. H. M. asks how to obtain crystals of bismuth. A. This is effected most easily by melting two to four pounds of the metal in a hemispherical iron ladle, allowing it to cool slowly until a crust is formed on the surface, then breaking this with a wire and pouring out quickly the still fluid metal from within. This yields, if not always large crystals, at least faces, from which project the corners of numberless cubes. Fine large crystals, with beautiful stair-like arrangement, can be obtained only by making the bismuth chemically pure, which is a tedious operation.

(30) P. H. V. asks whether one billion represents one thousand millions or one hundred millions; please put the figures the way they should be written to represent one billion. A. 1,000,000,000. French method correct for this country.

(31) C. M. D. writes: To-day when the wind was blowing pretty briskly, I felt, as I sat at my window in sixth story, a tingling sensation in my forehead, just above and between my eyes, such as would be caused by application of one of poles of an electric battery to that part. Can you account for it? Could there have been a current of electricity in the air? The wind was blowing from Western Union building and across hundreds of wires toward me. I have some curiosity to find out the cause of the sensation, which was not unpleasant, and which was not neuralgic or painful in the least. A. We think the sensation experienced by you could hardly have been produced by electricity. It was probably due to the cooling of the forehead by the rapid evaporation of perspiration; however this is a subject that will bear investigation.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

A. S. C.—It is a titaniferous iron ore; it cannot be smelted to advantage.—G. F.—A. The pyrrhotine is not nickeliferous and cannot be profitably worked for the small amount of gold which it carries. B. is not free milling—it contains too much galena, though not enough for smelting. It must be roasted.—H. W. McC.—Impure kaoliu, or porcelain clay, if properly washed may be useful in the manufacture of cheap white ware, etc.—N. G. F. B.—They are tourmaline, muscovite in quartzite, and biotite.—W. M. H.—No. 1. Missing. No. 2 contains 80 per cent of lead. No. 3 is also rich in lead, carrying about 5 ounces of silver per ton. It may be smelted in the simple blast furnace; few smelters desilverize their lead. It is sold as base bullion on assay.—J. E. B.—No. 1 is plumbago; if properly washed and purified, worth about 7 cents per lb.—B. F. J.—It is a bituminous shale; it will yield oil, gas, and tar upon distillation. No. 2 is a jaspery hematite. No. 3 is an impure limonite. No. 4 is a silicious limestone, and if properly burned will doubtless yield a good hydraulic cement.—F. J. R.—No. 1 is chalcopyrite, a copper ore. No. 2, the gray part is fibrous zeolite. No. 3 is hornblende and quartz. No. 4, fibrous amphibole. No. 5 is leucopyrite or arsenide of iron.—S. A. S.—The vine sent is the climbing wild hemp (*mikania scandens*), common in the middle Southern States.—J. E. T.—The box contains fragments of semi decomposed orthoclase and sandstone, serpentine rock and impure manganite, or ferromanganese.—J. M.—It is nodular iron pyrites, iron sulphide.

COMMUNICATIONS RECEIVED.

On the Cause of Boiler Explosions. By A. J. P.
On the Wheel Question. By J. K.
On the Movement of Light in Space. By A. S.
On Easily made Slide Valve. By F. O.
On Diet. By T. B. McC.
On the New Optical Delusion. By C. L., H. W. F. A. O., R. H. B.
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[OFFICIAL]

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Boot nailing machine, W. G. Budlong, Providence, R.I.
Exercising apparatus, W. I. O. Bryan, Jr., N. Y. city.
Gearing conversion, I. M. Avery, New York city.
Knitting machine, Home Knitter Co., Canton, Ohio.
Railways, J. S. Williams, Riverton, N. J.
Regulator for steam engines, R. K. Huntoon, ——, Mass.
Transmitting rotary motion, S. Dennis *et al.*, United States of Colombia.
Water meters, J. H. Combs, Boston, Mass.
Weighing machine for grain, W. H. Allen, N. Y. city.
Wrench, A. Jackson *et al.*, San Francisco, Cal.