ment, as for the production of cube sugar, is given, with appropriate illustrations. The polariscope receives full consideration, and the concluding portion of the work is given to alcohol, its production and distillation. The commercial aspect fills the concluding chapters. The work is well indexed, and forms a standard contribution to the technical knowledge required in the making of sugar.

A NEW PRINCIPLE IN HELIOCHROMY. By Frederic E. Ives. Philadelphia: printed by the author. 1889.

This is an *edition de luxe* among photographic works. It treats of the possibility of producing photographs in natural colors. It is prefaced by the portrait of the author, which, in view of the reputation he enjoys in the photographic world, will be considered an interesting feature of the work. A comparison and criticism of the method used, by Dr. H. W. Vogel, completes the book.

THE VOLTAIC ACCUMULATOR. By Emile Reynier. Translated from the French by J. A. Berly. E. & F. N. Spon, 125 Strand, London; New York: 12 Cortlandt Street. 1889. Pp. xv, 202. Price $4.

The title of this book, brief as it is, describes its contents. It is a treatise on storage batteries, and gives in much detail the theory of their action, their merits, their defects, and a large amount of valuable practical information. A thorough review of the book would be impossible in the space at disposal, but it is enough to say that the subject is admirably treated, and the contents are arranged in the systematic manner that so admirably distinguishes French scientific works.

A LABORATORY GUIDE IN CHEMICAL ANALYSIS. By David O'Brine, E.M., M.D., D.Sc., Professor of Chemistry and Geology in Colorado State Agricultural College. Second edition. Entirely rewritten and revised. New York: John Wiley & Sons. 1889. Pp. 237. Price $2.

This work is intended for the use of students, and is an abstract of qualitative analytical work. The logical way in which it is put forth and its general arrangement are most praiseworthy. A very valuable section is that devoted to poisons, ptomaines, etc., to which 36 pages are devoted; general stoichiometry is the matter of the concluding chapter.

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 This is for our information, and not for publication.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

(651) H. H. A.—Salt water does not freeze as readily as fresh water, but in the case of shallow running water, whether it be salt or fresh, freezing will sometimes take place first on the bottom, whereas if the water be still the ice particles are ordinarily first formed on the surface.

(652) J. R. N.—We know of nothing practical but chisel and hammer for taking clinkers from fire brick. Burning oyster shells in the fire is sometimes recommended.

(653) W. J. S. asks for receipt for gumming labels. A. Try following:

1. Dextrine	2 parts.
Acetic acid	1 "
Water	5 "
Alcohol	1 "
Or 2. Gelatine	2 parts.
Rock candy	1 "
Water	3 "

(654) J. W. H.—The largest built-up all-steel guns now in actual use in the United States navy are 8 inches. Some 10 inch all-steel guns are now finished or partially finished at the Washington navy yard. The guns on the Boston are 8 inches; 12 inch guns are in course of construction with cast iron shell, steel tubed and steel hooped. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 684, for the "Progress of Our New Navy."

(655) J. J. B. asks: What material, and how applied, is used to coat tin dishes, to withstand the action of chemicals used in developing and toning photos? A. Use a quick-drying asphalt varnish, such as sold for bicycles.

(656) W. F. L. writes for a receipt for a floor varnish that will stand hard wear. What shall I put in to make it a cherry color? A. Use good hard drying varnish from a reputable maker. Color with dragon's blood.

(657) N. C.—Good machinists that are honest and faithful always stand high in the estimation of employers. The country has never had too many of them. The idling, slipshod sort are in excess. We advise you to enter a small shop making any kind of machinery, near at home.

(658) C. H. asks: 1. What is lock jaw and what are its causes? A. Lockjaw or tetanus is a spasmodic disease, characterized by painful, involuntary, and protracted contraction of the muscles. It is almost invarialy consequent upon a wound or injury, although in hot climates and particular localities it may occur without such injury. 2. What are considered the ten greatest works of fiction? A. Opinions differ. Almost all would include "Les Miserables," "Pendennis," "Vanity Fair," "Robinson Crusoe," and some of Balzac's, Dickens', and Fielding's novels in such a list. 3. Who is considered the world's greatest novelist? A. Here opinions also differ. Victor Hugo, Thackeray, Dickens, Fielding or Balzac might be named.

(659) G. W. S. asks a formula for white paint for boat work, also for house work inside. A. Zinc white with a little varnish makes the best finish, and does not turn yellow.

(660) C. H. S. asks: Can you inform me how long it takes electricity to go through the Atlantic cable? A. Practically instantaneously or in a fraction of a second.

(661) G. H. asks: 1. What is the cheapest and easiest process to convert crude pyroligneous acid into commercial acetic acid? A. Neutralize with sodium carbonate, evaporate to crystallization, drain the crystals, heat just enough to decompose any tarry matter, and distill with excess of sulphuric acid. The distillate will be comparatively pure acetic acid. 2. How is crude creosote, as produced by distilling wood, converted into commercial creosote? A. The United States Dispensatory gives the following method of preparation: Creosote is obtained either from wood tar or from crude pyroligneous acid. When wood tar is used, it is distilled until it has attained the consistence of pitch. The distilled liquid divides itself into three layers, an aqueous between two oily layers. The inferior oily layer, which alone contains the creosote, is separated, and saturated with carbonate of potassium to remove acetic acid. The liquid is allowed to rest, and the new oil which separates is decanted from it. This oil is distilled, and yields products lighter than water and a liquid heavier. The latter alone is preserved, and after having been agitated repeatedly with weak phosphoric acid to neutralize ammonia, is allowed to remain at rest for some time. It is next washed as long as acidity is removed, and then distilled with a fresh portion of weak phosphoric acid, care being taken to cohobate from time to time. The oily liquid thus rectified is colorless, and contains much creosote, but also a portion of eupion, or light oil distillate. To separate the latter, the liquid is mixed with a solution of caustic potassa of the density 1·12, which dissolves the creosote, but not the eupion. The eupion, which floats above from its levity, is then separated, and the alkaline solution of the creosote is exposed to the air until it becomes brown, in consequence of the decomposition of a foreign matter, and is then saturated with sulphuric acid. This sets free the creosote, which is decanted, and again distilled. The treatment by solution of potassa, sulphuric acid, etc., is to be repeated until the creosote no longer becomes brown by exposure to the air, but only slightly reddish. It is then dissolved in a stronger solution of potassa and distilled again, and finally redistilled for the last time, rejecting the first portion which comes over on account of its containing much water, collecting the next portion, and avoiding to push the distillation too far. The product collected in this distillation is creosote. When creosote is extracted from pyroligneous acid, the first step is to dissolve sulphate of sodium in it to saturation. The oil which separates and floats about is decanted, and, having been allowed to remain at rest for a few days, is saturated by carbonate of potassium with the assistance of heat, and distilled with water. The oleaginous liquid obtained is of a pale yellow color, and is to be treated with phosphoric acid, etc., as above detailed, in relation to the treatment of the corresponding oil obtained from wood tar. 3. How is acetate of lime made and what is it used for? A. By neutralizing pyroligneous acid with lime. It is used as a source of acetic acid. The literature of the subject is scattered and limited. We can supply you with the part of Spons' Encyclopedia treating of it for 75 cents. In Ure's Dictionary and similar works you will find refereuces to it.

(662) C. W. A. asks: What are the ingredients used and by what process is compressed yeast made, such as is sold in small cubes wrapped in tinfoil? A. Previously malted barley and rye are ground up and mixed, next put into water at a temperature of 65° to 75°; after a few hours the saccharine liquid is decauted from the dregs, and the clear liquid brought into the state of fermentation by the aid of some yeast. The fermentation becomes very strong, and by the force of the carbonic acid which is evolved, the yeast globules are carried to the surface of the liquid, and, forming a thick scum, are removed by a skimmer, then placed on cloth filters, drained, washed with a little distilled water, and next pressed into any desired shape by means of hydraulic pressure, and covered with a strong and well woven canvas. It keeps from eight to fourteen days, according to the season, and is said to be excellent.

(663) H. B. L. asks (1) the standard railroad gauge of England. A. English railroad gauge 4' 8½", same as American gauge. 2. Diameter of largest locomotive drivers. A. 78 inches is the largest that we know of in the United States. 3. Why property is leased for 99 years in Illinois. A. The leasing of property for 99 years is not confined to Illinois. It is a very old custom, in use in all the States, derived from English practice. 4. How shellac is bleached. A. Shellac is bleached by exposure in thin strips to the sun. There is a chemical process for bleaching in solution, somewhat complex, described in the "Techno-chemical Receipt Book," which we can mail for $2.

(664) W. G. C. asks: 1. What is the best way to ventilate a store show window to prevent steaming of the glass without letting in dust on the goods? A. For a closed window, where lights are burning, ventilation that shall be as free from dust as possible should be provided by drawing air from above the roof. 4 inch tin pipes from the top of the window, carried up inside of the building through the roof or to a near-by flue, will carry off the moist foul air, while similar tubes from the roof to the bottom of the window will supply fresh air. 2. What is the best way to ventilate a bedroom with ordinary open grate, windows, and doors without causing an unpleasant draught? A. Bedrooms with doors, windows, and grates need no special ventilation when there is a fire in the room. There is leakage of air through imperfect window casings and door crevices to keep the fire burning and supply a chimney draught for ventilating purposes without noticeable draught in the room. At all other times, dropping the upper sash equal to requirements is all that may be needed. If a direct draught is felt, the curtain or a shield may be easily arranged to prevent ill effects.

(665) F. Mfg. Co. ask: Please give a few suggestions as to gluing wood on metal, for strength and durability. A. Glue with a small percentage of glycerine added adheres well to metals. A small amount of molasses added to glue will act in the same way. Tannin added to glue makes it strong and adherent. Bichromate of potash renders glue waterproof.

(666) A. S. writes: 1. What is the red light used on stage made of? I find some shellac in it. Also give the formula for the green light. A. Mix 4 parts nitrate of strontium with 1 part of pulverized shellac; do not pulverize together. For green use nitrate of baryta. If you substitute an equal weight of chlorate of potash for one or two parts of the nitrate, it will be more vivid. 2. Where can I get seven call bells tuned, or how could I tune them? A. To raise the pitch, turn off near the lip; to lower, turn off the central zone.

(667) R. K.—The emery strap is made by brushing good strong glue upon the leather and quickly sprinkling the surface with flour of emery; when dry, the loose emery is brushed off. Crocus is mixed with a little oil and rubbed into the leather. Smooth on piece of glass.

(668) G. D. D. asks: 1. Can core of armature of simple electric motor be made of Swedish iron, welded and turned, instead of using iron wire, and yet be as good? A. Swedish iron will answer, but not quite as well as the iron wire. 2. Will common iron answer as well as Swedish? A. No.

(669) J. M.—For hardening thin sheet steel, heat in an iron box or pan packed in sand and charcoal equal parts; dip edgwise as nearly vertical as possible. After drawing the temper, the warp can be taken out with a hammer. The charcoal will keep the surface from oxidation, but if necessary to clean the surface, use a bath of muriatic acid 1 part, water 3 parts. A half hour's immersion will clean the surface. You cannot harden satisfactorily by tying the sheets together. Polish with flour emery on a buff or brush wheel wet with oil, gloss with crocus on a buff wet with alcohol. The diamond is easily burned, but fused with much difficulty, losing its transparency and really ceasing to be a diamond.

(670) J. B. S.—A system of Bunsen burners may be arranged under a boiler for house heating. Such are used under small boilers for experimental purposes. The small jet system has also been tried. The cost for heating buildings in this way with other than natural gas has heretofore been a bar to its success.

(671) E. S. K. asks for a good recipe for making a first-class hard lubricant, suitable for heavy or light work, out of the residuum obtained by refining petroleum, and also of a means of removing the disagreeable odor connected with it. A. We fear that you will have trouble in removing the odor you speak of. If it is not very bad, filter through bone black, or apply the following more complicated process: Heat with steam to 68° Fah. and treat with 10 per cent of sulphuric acid of 60° B. After standing and decanting treat with bichromate of potash dissolved in water. Heat after decanting to 176° Fah. with 10 per cent bone-black, settle and filter. You may mix sperm oil with the residue, but it would be well to wash the petroleum oil with warm dilute solution of soda or lime and afterward with water, before adding the sperm oil.

(672) G. W. T.—The power of a bicycle to ascend a grade depends upon the comparative length of the crank and diameter of the wheel. A short crank on a large wheel does well on level grades, but for hill riding the long crank and smaller wheel is needed.

(673) R. A. C. cannot succeed in changing blue prints to a brown according to formula given in vol. lv., No. 8, page 113. Try the following instead:

Borax	2½ oz.
Hot water	38 "

When cool add sulphuric acid in small quantities until blue litmus paper turns slightly red, then add a few drops of ammonia until the alkaline reaction appears and red litmus paper turns blue. Then add to the solution 154 grains of red crude gum catechu. Allow it to dissolve with occasional stirring. The solution will keep indefinitely. After the print has been washed out in the usual way, immerse it in the above bath a minute or so longer than it appears when the desired tone is reached. An olive brown or a blackish brown is the result.

(674) J. A. G.—The lactometer is used by placing in a vessel of the milk to be tested at a temperature of 60°. If it floats with the 100° mark even with the surface or a little above it, the milk is considered pure. The cream gauge is used by filling with milk and observing what per cent of cream rises to the top. Its indications are of little value. The lactometer is so graduated that as it sinks, the degrees are assumed to indicate the percentage of pure milk. The 100 mark corresponds to a specific gravity of 1·029.

(675) A. S. asks for something better than putty to fill up cracks in a boat. A. Melt equal parts of pitch and gutta percha in an iron pot; thoroughly mix by stirring. Make up in sticks and melt into the cracks with a warm iron.

(676) H. H. asks how to make a small telephone out of baking powder boxes. A. Remove the bottoms. Tie firmly a piece of parchment over the end of each, and attach the end of a string to the center of each parchment by passing it through a hole in the center and knotting it. On stretching the string between the two cans, a species of acoustic telephone system will be formed.

(677) G. M. C.—After 4 to 6 days, when desquamation begins, scarlet fever is especially contagious. Anointing of the patient with vaseline is recommended as a protection against contagion from this cause. As disinfectant for clothes and other dangerous sources of infection, 1 part sulphate of zinc dissolved in 10 parts of water may be used. It is a strong poison. Fumigation with burning sulphur, with bromine, or with chloride of lime and vinegar mixed, are excellent as after treatment of the room, curtains, etc. These chemicals, however, tend to fade or bleach tissues.

(678) G. B. S. asks (1) the lifting power of one cubic yard of best gas for balloon purpose. A. A cubic yard of hydrogen gas will lift 1¾ pounds. 2. The breaking strain of 1½ inch best steel cable, and what would a mile length of the same weigh? A. Breaking strain of 1½ inches diameter steel rope, 65,000 to 70,000 pounds. Weight per foot 3·14 pounds, or 16,579 pounds to a mile.

(679) A. L. writes: Can the SCIENTIFIC AMERICAN or any of its readers inform me if there is any other way to smooth down the tones of a new violin than by using the bow upon it? A. Give it time and plenty of playing. Many violins have been ruined by being tampered with to improve their tone, when a little patience would have effected the same result. If the violin is of originally poor quality, nothing will perfect the tone.

(680) C. J. C. asks: What method is used in transferring printed matter to glass? A. Soak print in water, varnish glass with dammar varnish or Canada balsam; while still tacky place the print smoothly against it and allow it to dry. When dry, rub off most of the paper with the wet finger and revarnish. The trouble is that printed matter is generally deficient in ink and gives a weak transfer.

(681) J. B. P. writes: In a recent issue, in answer to what will change the odor of turpentine, it gives as changing the odor of naphtha: "Bichromate of potash and sulphuric acid." Can you give me the proportion of each substance used for say one gallon of naphtha or kerosene, and how mixed with the oil, and also whether the mixture is to be warm or cold? A. No fixed quantities can be given. To one pound of oil of vitriol add two ounces pulverized bichromate of potash, and agitate the cold solution with the benzine. After standing long enough to settle, decant the benzine. Use care in pulverizing the bichromate, as inhalation of the dust produces ulcers. Distillation from quicklime with rejection of first and last distillates is recommended also.

(682) G. J. G. asks: Is the vapor of carbolic acid injurious to the lungs? A. It is not generally considered so.

(683) W. J. H. asks: How steel-cased lead rifle balls are made? A. The shells are pressed into shape from thin sheets of soft steel in the same manner as in the making of cartridge shells. The lead is then forced into the shell by a powerful press.

(684) J. F. H. writes: Please give a receipt for preserving eggs, suitable after several months' keeping for food. A. We refer you to SUPPLEMENT, Nos. 65, 107, 308, and 317, which we can supply for 10 cents each.

(685) W. W. G. writes: I want to know if there is any cement made that will withstand the action of sulphuric acid, a light greenish blue color, or how to make it, or if such a cement is made, but of a different color, how to color it? A. Much depends on the heat and concentration of the acid. Sealing wax will stand it under ordinary conditions, but concentrated acid might affect it. The surest thing would be enamel, if you could heat the objects enough to melt it. Generally such cements are dark colored. For blue sealing wax, ultramarine and any dry white such as barytes may be used as coloring matter.

(686) I. E. asks: Is there any means, besides the common method of dry scraping, by which the old paint on furniture may be removed, leaving the natural surface of the wood exposed and uninjured? A. A solution of caustic potash applied to the paint will loosen it in a few hours, or it may be burned off by blistering with a gas jet and small bellows or blower, and scraping before it cools off. An alcohol blowpipe is sometimes used.

(687) G. O. asks: 1. In winding the armature of the simple electric motor with No. 20 wire (motor to be used as a dynamo), should I wind more layers to make up the required thickness, or should I make the polar section of the field magnets smaller? A. If the space to be filled is slight, you might add more wire, otherwise reduce the bore of the field magnet. 2. Also, how many sixteen-candle power lamps would the dynamo light? A. It will probably light one such lamp.

(688) H. G.—As manuals of shorthand we recommend and can supply Burns' Fonic Shorthand, $1, Munson's Complete Phonographer, $1.50.

(689) W. N. G. asks for some reliable recipe that will take lime stains from California redwood? A. Try dilute acid, such as vinegar or lemon juice, or one part hydrochloric acid in fifty parts of water. Experiment on useless pieces of wood until you hit it.

(690) E. S. & S. ask for mixture that will remain sticky on paper exposed to the weather out of doors. A. Use a mixture of raw linseed oil and resin melted together. Vary the proportions until you obtain a suitable consistency.

(691) C. W. B. asks at what temperature water separates into hydrogen and oxygen. A. It depends on the pressure. Water begins to decompose at 1,760° to 1,832° F. It proceeds to a limited extent and stops, and begins again at 2,192° F. The trouble in these investigations is to separate the gases, as otherwise they recombine in cooling. By passing them through a porous tube, the hydrogen diffuses through the pores the quickest, and is thus partially

prevented from recombining. 2. What comparative space do the gases occupy as compared to the water of which they are made? A. 1,844 times the volume of the original water at 32° and 30 inch barometer.

(692) M. S. writes: 1. Will not magnesium ribbon, if heated, unite with chlorine, with the evolution of heat and light? A. Yes. 2. Ayrton, Practical Electricity, p. 11, says: "To specify the strength of the current by the sulphuric acid voltmeter, neither the shape nor the size of the plates need be taken into account within wide limits." My experiments do not seem to confirm that. Is the statement well founded? A. Yon are wrong, and the authorities are right. 3. If two cylinders equal in size be filled, the one with chlorine, the other with hydrogen, placed mouth to mouth, inverted a few times, and a piece of manganese ribbon be burned near by, no explosion takes place. And yet when a flame is applied at the mouth, the gases explode. Why not with actinic light? A. If the experiment is properly conducted, it will succeed. 4. In Hoffmann's experiment with hydrogen and chlorine, how are the hydrogen and chlorine made to mix? The aperture in the stop cock is 2·5 mm., and yet the gases will not mingle rapidly enough for a class experiment. A. Turn tbe apparatus so as to have the chlorine uppermost, and after a few minutes reverse it.

(693) H. D. L. asks: Will you please inform me through your paper what is the best light substance that can be used as a deadener or husher of sound? How soft can rubber be obtained, and where? Or is there any way of making it soft? Or quite pliable? A. Cork, sawdust, asphalt concrete, curled hair, or felting are excellent deadeners of sound. Soft rubber can be procured from manufacturers. Its softness depends on the degree of its vulcanization. Possibly sponge rubber, such as used by draughtsmen, would answer yonr purpose. Once hardened, as by vulcanizing, you cannot soften it.

(694) C. C. J. writes: I have heard that there is a kind of ink which, when you write with it, makes no mark, but when you hold the letter over a lamp, it makes itshow like ordinary ink. I would like to know if there is such an ink, and how it is made. A. Dilnte sulphuric acid one volume, water twenty volumes, may be used with a quill pen, and will produce the above effect. The writing will be black or dark brown and quite indelible.

(695) C. G. asks: 1. What is fuller's earth, which is used in connection with the fulling of cloth? A. It is a white natural deposit resembling clay, and known as infusorial silica. It is made up of the microscopic siliceous skeletons of diatome, a minute form of living being. 2. What do they use to bleach cloth? A. Chlorine, the cha acteristic constitnent of bleaching powder, is the great hleaching agent. The cloth to be bleached is subjectcd to quite an elaborate process, involving treatment with alkali and otherchemicals.

(696) L. B. asks: How can I melt or shape rubber to any form (I have the mould), and have a smooth surface, also to have same elastic? What is used to do this with, and where can I get the rubber, or is any rubber good to get good results? A. We refer you to our SUPPLEMENT, Nos. 249, 251, and 252, for full details of rubber manufacture. You mnst have pnre rubber mixed with sulphur, and after pressing it into the mould must vulcanize it by heat while it is held in shape. Any rubber manufacturer can supply the gum ready for vulcanizing. Coat the mould with soapstone, to prevent adherence of the rubber.

(697) Enquirer asks: 1. How electricity is applied to a machine to produce motion. Kindly abstain from technical terms as much as possible. A. For a description of a motor which, if understood, will probably cover your ground, we refer you to our SUPPLEMENT, No. 641, which we can send you for 10 cents. 2. We are told that the canse of the different phases of the moon, such as new, full, gibbous, are formed by the earth casting a shadow on its snrface. Now, if such is the case, how isit possible for the earth, which will always cast a convex shadow, as in the new moon, to cast a concave shadow, as it would appear to do when the moon appears in that phase called gibbous? A. If you are so told, your informant is in error. The phases of the moon are caused by the different directions of the sun's rays with respect to the moon's surface. When the shadow of the earth falls on the moon, it is said to be eclipsed. This shadow is always convex.

(698) F. A. writes: I would like to know through your paper whether tobacco using (smoking or chewing) isapt to make a man nervous or not. Can you give me an effective antidote for tobacco habit? A. Excessive use of tobacco may affect the nerves and heart. The best antidote is rcsolution. Stop using tobacco until the habit is conquered.

(699) J. C. S. writes: I would like to attend some good school, either in New York or Brooklyn, where I could learn how to model and draught boats. A. Your best plan is to enter some ship yard and work in the draughting room, with inspection of the general work in the moulding loft and yard. No school that we know of will answer your requirements.

(700) W. S. asks if glycerine is good for the teeth and gums. A. It is not generally supposed to have any good effect upon either.

(701) J. M. B. asks: 1. Is the spectroscope used to advantage now in analysis, and how is it used? A. It is used largely in scientific investigations, in physics, astronomy, and chemistry. In chemical analysis it is used to a limited extent for detection of the alkalies, sodium, potassium, lithium, etc. The substance is ignited in a colorless flame, and its spectrum is examined. 2. What is the best kind of a spectroscope, and where can I get one? A. A good glass prism spectroscope is probably the best. For dealers in scientific apparatus, consult our advertising columns. If you wish to make one yourself, we refer you to our SUPPLEMENT, Nos. 651 and 672. 3. What work is the best treatise on spectroscopic analysis, and where can I get it? A. We can supply you with Lockyer's Spectrum Analysis, price $2.50, Roscoe's Spectrum Analysis, $5. Also consult the index of our SUPPLEMENTS, which contain much matter on this subject. 4. Can a person take a compound substance and with the spectroscope tell its component parts at once? A. Not generally. It takes experience to use it advantageously, and in actual analysis its use is very limited. In comparatively very few cases it could be thus used.

(702) W. L. C. writes: I should like to ask you if an analysis has ever been made of human saliva; if one has been made, of what ingredients it is composed. I understaud that the simplest experiment in voltaic electricity is that in which a piece of zinc is placed on one side of the tongue and a piece of copper on the other: they touch, and a stinging sensation is felt. Now, why cannot a battery be made in which the fluid is a chemical combination made to imitate saliva? This is an original thought, and I hope you will not think it foolish. A. The saliva has been analyzed. As far as regards electric action, the chloride of sodium (common salt) contained in it is the active agent, and has been very extensively used in batteries. It gives a low voltage, and the couple dependent on it alone is quickly polarized.

(703) G. H. S.—For formula for making printers' rollers see Note and Query No. 444, in SCIENTIFIC AMERICAN of March 9, 1889.—For intensifier for wet-plate photo. in line work photo-zinc etching: After fixing the wet plate in a cyanide of potassium solution, intensify with mercury and ammonia as follows:

No. 1.

Water	80 ounces.
Chloride of ammonium	2 "
Dissolve, then add:	
Bichloride of mercury	2 "
Dissolve and filter.	

No. 2.

Liquor ammonia 0·880	5 ounces.
Water	20 "

Dip the plate in No. 1 till it is whitened, then wash, and flow over with No. 2. Another method is as follows. Prepare:

Water	8 ounces.
Ferrid-cyanide of potassium	6 parts.
Nitrate of lead	4 parts.
Dissolve and filter.	

Pour over the plate and keep on till the film is bleached. Wash well under the tap. Then flood with—

Nitric acid	1 oz.
Water	80 "

Allow this to remain on a few seconds, then wash, and flood with—

Sulphide of ammonia	1 part.
Water	5 parts.

which will at once turn the film an intense black; again wash, and flood with the nitric acid solution, again wash, and set the negative up to dry. We quote the above from Wilkinson's work on photo-engraving and etching.

(704) A Subscriber asks how the ever-ready ink pads for rubber stamps are made. A. By saturating the pad with aniline colors dissolved in alcohol and mixed with glycerine. Consult the SCIENTIFIC AMERICAN of Nov. 24, 1888, where you will find an article on type writer ribbon, giving methods for making inks suitable for pads.

Replies to Enquiries.

The following replies relate to enquiries recently published in SCIENTIFIC AMERICAN, and to the numbers therein given:

(420) How to Perforate Glass.—For the information of E. P. B., (420), page 154, of your paper of March 9, 1889, I would say that I bored two 1⅛ inch holes in crystal plate, without any particular trouble, and now have them mounted, and any one of ordinary ingenuity can doit in the same way. On the fly wheel shaft of my foot lathe there is a wooden pulley, from the side of which projects the crank pin to drive the lathe. The other end of the shaft corresponds. From this pulley I ran an endless cotton rope (clothes line) to a three inch wooden pulley, which I secured to a piece of ⅝ inch pipe, brass, by putting the pipe through a hole in the center of a piece of sheet brass, soldering it to the pipe, and screwing it to the flat sideof the pulley. I supported the pipe vertically in maple-wood bearings, all done in a rough way, but put up true. Lubricate with tallow by heating the wood overa fire, enough to melt the tallow in, before you put the bearings on; this will be the only time you need to put tallow for this job. On the lower end of this small pipe solder a piece of copper or brass pipe, of the size you wish the hole in the glass, then put it in the lathe and turn your pulley groove for the endless rope, also face the end ot the pipe true, which is to rest on the glass. In the upper end of the pipe place a small funnel; suspend over this a can of water having a plug by which you can let the water drop into the funnel. Get a pound of coarse emery, 10to 15 cents. To fix your glass, select a place as much out of the way as you can, get an old box or other support, place it where you can run your endless rope to it, level the box and fasten it to the floor. Make a case that will hold your glass and an inch to spare, so as not to pinch the glass; the sides of case are of rough boards, four inches or more high, to protect the glass from accident. In the center of this case fasten a dome-shaped circular piece of board, ¾ of an inch thick, turned true in the lathe. Exactly over the center of this dome place your vertical pipe and pulley, so that it can be raised and lowered in its bearings. Place the glass on the block without any other support, then press the pipe end on to the glass, arranging a spring to give a constant pressure. This will keep the glass level and make it bore faster. Make a ring of putty around the center of the glass, about five inches in diameter, to keep in the emery and water. If the rope slips, make a tightener with a little sash or other pulley, and give the rope a little powdered resin. Now pour emery into the funnel and start the water drip, and while you are running your lathe, making the rest of your machine, you will be boring your glass.—C. R. W.

☞ Books or other publications referred to above can, in most cases, be promptly obtained through the SCIENTIFIC AMERICAN office, Munn & Co., 361 Broadway, New York.

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AND EACH BEARING THAT DATE.

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