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 diatoms, 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 tbe .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 tbe 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 solutiou, 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 tbat 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, ⅜ 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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