Rochester, N. Y., 8th Dec. 1874.

MR. G. W. HARROLD.

DEAR SIR:—THE PROUTY STEAM TRAP that you put in forus works to our entire satisfaction; you may now remove the other trap, as it is no longer of any use to us. We consider your Trap in every respect superior; it saves a great amount of constant labor in drawing off water, which we had to do almost constantly when heating on different floors with the other Trap. Yours respectfully,

SIBLEY, LINDSAY & CURR.

Business and Personal.

The Charge for Insertion under this head is $1 a Line.

Notes & Queries

M. J. will find the recipe for diamond cement on p. 90, vol. 30 (cementing whalebone to wood).—W. H. H. and T. E. C. will find directions for bronzing iron on p. 283, vol. 31, and for tinning iron on p. 362, vol. 31.—W. L. D. can make a magnet by following the directions on p. 218, vol. 31.—J. G. M. & Co. will find a recipe for paste for useon tin on p. 253, vol. 30.—J. E. H. can nickel plate steel by following the instructions on p. 174, vol. 30.—L. T. can repair his rubber boots by following the directions on p. 203, vol. 30.—C. McE. can make a carmine red ink by the recipe given on p. 200, vol. 30.—F. M. H. and many others will find directions for nickel plating on pp. 43, 90, 346, vol. 31.

(1) E. C. asks: 1. In the present Atlantic telegraph cable is, there a floating battery, or has there been one at any time since it was laid, in mid-ocean? A. No. 2. What is the size of the batteries used at the shore ends of the cable? A. Quart cells. 3. How small a battery is it possible to use and send a communication over the cable? How small a battery has been tried, which showed indications at the other end? A. A battery composed of a single percussion cap, in each case. 4. Would it be possible in taking up the cable, beginning in mid-ocean, to communicate with the shore, unless they first separated the cable or outer coating? A. It would not.

(2) N. N. asks: What is the best battery for running a revolving armature? A. A largesize Daniell, battery or the modification of it known as the gravity or Callaud battery.

(3) S. E. T. says: 1. I wish to convey water from a stream to a tank 1,000 feet distant and 30 feet higher than the stream. Will I get as good a supply of water with the same power if I lay a 3 inch pipe over the first 300 feet, a 2 inch pipe over the next 200 feet, and an 1½ inch pipe over the remainder, as with a 2 inch pipe over the whole distance? A. The data are not complete, but it would be better to have the pipe the same size throughout. 2. Will chestnut sticks, with a 2½ inch hole bored through them lengthwise, united with iron couplings, answer the purpose for pipe? A. Yes. 3. How many horse power will it require to give a supply of 10 gallons per minute? A. From 2 to 2½ times the power required to lift the water, neglecting friction.

(4) N. N.—A very pretty magnified view of an aquarium or other object is obtained through a telescope when the objective and eyepiece are very far apart, in a tube of extra length.

(5) I. F. J. asks: How can I repair an opera glass of which the plating is discolored and the ivory broken? A. Nickel plate the metal surface, and cover with morocco leather attached with marine or other glue.

(6) S. D. E. says: 1. Eight months of labor and patience have rewarded me with a splendid reflector. I used Draper's method of silvering on glass, as described in your answers to correspondents. Any one who follows the formula must succeed. My reflector is 12 inches in the clear, with 10 feet focus. I want to set the reflector at an angle, so that I can view direct instead of using an angle mirror; and I wish to leave the tube 2 feet longer than the focus, so that my head will not be in the way of the light. Will this answer? A. If your mirror gives sharp definitions, mount it as a Newtonian; if not, mount it as an aerial, as figured by Dick. 2. Please tell me what the focal distances and diameters of the two eyepieces should be (the focus spot by the sun covers about half an inch). A. To construct a battery of eyepieces, take the highest power, say 600, and divide it by 1·5=400, the next power; 400+1·5=266+1·5=177, +1·5=59; or begin with the lowest, say 60, and make each power ½ greater than the one below it. 3. How far should the first glass (next to reflector) be beyond the focus? Should it be plano-convex or double convex? A. Focus is within the Huyghenian eyepiece. See No. 48, October 17, 1874. A Ramsden or positive eyepiece, for micrometer or reticule, is constructed thus: The focus of the field lens=twice the focus of objective divided by the power required. Focus of eye lens is 0·555 or $\frac{5}{9}$ that of field lens. Distance apart is $\frac{4}{9}$ or 0·444 of focus of field lens. Equivalent single lens is ½ focus of field lens. Apertures are ⅓ of focal length. Image is $\frac{1}{10}$ of focus of field lens in front of it. Both lenses are plano-convex, the convex sides facing each other.

(7) Z. T. R. says: I wish to convey the water of a spring to my dwelling, which is at a distance of 600 yards; the pipe will have to cross a creek and swamp, making the lowest point of the pipe 40 or 50 feet below the fountain head. The spring affords water enough to fill a 2 inch auger hole through a weir with a 6 inch head. What size of pipe will be required for the work, the discharge being 15 or 20 feet below the receiving point, and consequently at a head of 15 or 20 feet at the house all the time? A. A one inch iron pipe will serve your purpose, and, notwithstanding the friction of so long a line, give water enough for a family's use. The salts in the water will very likely coat it so as to prevent the rusting of the iron. The usual thickness of a one inch wrought iron pipe will be strong enough for the pressure at the lowest point. The exterior may be covered with a wash of coal tar. 2. Who makes the best pipes, to keep water free from all poisons and rust? A. Tin-lined lead pipe is supposed to be the best pipe for the purpose. All pipe should be laid below the reach of frost. The power of a water wheel is best ascertained by experiment.

(8) J. G. H. says: I have a sawmill boiler in which the distance from the bottom of the boiler to the top of the arch is 8 inches from the arch. The brickwork is gradually sloped. We fire with sawdust, but have to use some dry slabs to get steam enough. An engineer tells me that if I make the arch 10 or 12 inches from the boiler, and leave the space from the arch to the brick wall empty instead of filling it up, I will be able to burn more sawdust and refuse and keep up steam, without using slabs. I want to burn all the sawdust and refuse I can, and at the same time have steam enough. Which is the better way? A. We do not think that the change will produce any decided advantage, unless you make a combustion chamber, by admitting air into the space back of the bridge wall.

(9) D. N. B. asks: 1. Is it economy of fuel to buy a 10 horse power engine and work it up to 15 horse power rather than work a 15 horse engine at its nominal capacity? How much work could a well made nominal 10 horse engine be made to do without over working or straining? A. We cannot tell you anything about nominal horse power, as it varies with different makers; nor is it possible to give general rules for the most economical manner in which to run all engines, as it depends upon a number of variable quantities. 2. How might the relative value of coke and Illinois bituminous coal be stated for making steam? A. It can readily be determined by experiment. Keep account of the fuel consumed and word done. 3. What power of engine would you advise putting in, to run machines requiring (according to manufacturer's representations) an aggregate of 10 horse? A. An engine of 10 effective horse power.

(10) H. L. says: 1. I wish to construct a two inch achromatic telescope and use it both as a terrestrial and astronomical one. What would be the best object glass, and what length of focus should it have? A. See answer No. 27, October 24, 1874. 2. How should I construct the eyepiece to match? A. Put the smaller plano-convex lens next the eye. 3. What are the names, distances, magnitudes, and masses of about ten of the nearest fixed stars whose distance has been roughly ascertained? A. 61 *Cygni* has a parallax of 0″45″, distance 44 millions of millions of miles; diameter of orbit 17 times that of the earth; light period 7 years. Sirius and *α Lyræ* have each a parallax of ¼ second; they are about 800,000 times as distant as the sun. 4. Please give the rates at which they appear to travel in their orbits, and towards what star they appear to travel, as well as the rate at which others move away. A. Stars approaching us are: Arcturus, 55 miles per second, Vega 44, *α Cygni* 39, Pollux 49, *α Ursæ Majoris* 46 to 60. Stars receding are: Sirius 18 to 22 miles per second, Betelgeux 22, Rigel 15, Castor 23 to 28, Regulus 12 to 17. The two fourth magnitude components of *γ Virginis* revolve round their center of gravity in 169 years; major axis, 7″. *Xi Ursæ Majoris* fourth and fifth magnitudes, 61 years, 5″. *ζ Herculis* third and sixth magnitudes, period 36 years; major axis 2½″. 5. What time does it take Sirius's companion to go round him? A. Four hundred years, 10th magnitude; mass of satellite=half mass of Sirius. Sirius is over three million miles in diameter. 6. What are the diameters of Saturn's moons? A. Titan is larger than Mercury. It can be seen with 1 inch aperture, Japetus with a two inch. 7. In what constellations can I find five of the largest nebulæ that have been found to be gaseous? A. Great nebula of *Orion*: Right ascension, 5h. 29m., declination S. 5° 29′. Nebula in *Andromeda*: 4° long, 2½° broad, R. A. 0h. 36m., D. N. 40° 30′. Dumb bell nebula, R. A. 19h. 54m., D. N. 22° 22′. Annular nebula in *Lyra*: R. A. 18h. 49m., D. N. 32° 52′. Horseshoe nebula, R. A. 18h. 13m., D. S. 16° 17′. Two copies of SCIENTIFIC AMERICAN for 1 year and two of *Science Record* will cost $10.

(11) J. McD. asks: 1. Is there any place in America or Europe where crude petroleum is used for making gas? A. There have been many attempts to employ it, some of which are still in progress. 2. Does such process pay economically, in comparison with coal? A. As yet, the various inventors have not succeeded in perfectly overcoming the practical difficulties.

(12) A. A. N. asks: Is there any way of preparing the sympathetic inks which are visible only when heated, such as solutions of Co $(NO_3)_2$, $CoCl_2$, etc., so that they can be used for printing or stamping? A. We do not know of any such method.

(13) J. G. S. asks: How can I make a cheap paste for putting up paper exposed out of doors, making it impervious to any kind of weather? I should like it to form some kind of hard surface similar to varnish. A. We know of no material that will answer all these requirements.

(14) C. W. asks: 1. Are the saltpeter deposits in the Big Bone Cave, Tenn., extensive? A. It is probable that saltpeter has been obtained by lixiviation of the earth in the cave. 2. Is it true that large quantities were obtained here for the rebel army? A. The amount, though considerable, would not cause this source of supply to supersede others.

How can I preserve guns with least trouble? A. Cover the iron with a mixture of tallow and white lead.

How must I treat brier root to prevent splitting, and how can I color it for a pipe bowl? A. Boil the wood for an hour or two in water, and dry slowly. To color, hold near the fire so as to gently warm, and by means of a feather coat the surface with dilute aqua fortis; oil and polish.

How can I dye hair switches dark brown? A. To a saturated solution of sulphate of copper (blue vitriol) add ammonia until the precipitate which falls is redissolved. For a mordant, to be first applied, use a saturated solution of ferrocyanide of potassium.

(15) J. B., of Wells, England, says: On removing a sheet of tin which had been placed immediately behind a looking glass plate (exposed to the sun) I discovered several circular spots, varying from two to four inches in diameter, with a dull silvery appearance and very smooth. If this was a coating of silver, can you explain how it was conducted from the plate to the tin, as the mercury on the plate did not come in contact with the tin, except at the edge of the plate? A. They were probably spots produced by a small amount of mercury volatilized from the back of the mirror, acting upon the tin.

I have two small pine trees (which I brought from America last winter) and wish to preserve. One especially is looking sickly, although both have grown a little. They were planted in a rich red soil in a low situation. Can you tell me what locality or soil would be most congenial to their growth? A. In this country, pine trees do not grow in rich, moist bottom lands, but upon arid, sandy solis.

(16) S. asks: What is a solvent of oxidized linseed oil? A. Turpentine.

(17) J. H. asks: What is a durable cement, for cementing burlaps to the edges of a frame made of building paper? A. Edmond Davy prepares a cement, which is well spoken of, by melting in an iron vessel equal parts of common pitch and gutta percha. It is kept liquid under water, or solid to be melted when wanted. It is not attacked by water; and it adheres strongly to wood, stone, glass, porcelain, ivory, leather, paper, feathers, wool, hemp, and linen fabrics, and even to varnish.

(18) H. W. asks: What is the best preparation to put upon the wood floor of a public building which is daily much used? A. In cases of this kind, the general practice is to use some cheap durable paint.

(19) J. H. A. asks: 1. Will oil in which steel is repeatedly hardened lose its hardening property? A. No. 2. Which is the best kind of oil for hardening steel? A. Common machine oil may be used; but for fine work, olive or cotton seed oil will be more satisfactory.

(20) J. W. asks: What materials are used to make amber-colored glass, beside manganese? A. Different shades of yellow may be imparted to the glass by the addition of the oxides of silver and antimony, and by finely divided charcoal; also by the presence of peroxide of iron in quantities not exceeding one per cent. The tints may be tempered by the addition of minute quantities of the purple of Cassius.

(21) J. K. asks: If a mixture of steam and air, after passing through red hot pipes, were admitted, by means of the draft, to a coal fire, would it insure a more complete burning of the smoke than if air alone were so used? A. It would be a dangerous experiment, as such a mixture (if a sufficient amount of heated iron were presented to the steam to liberate a part of the hydrogen) might be rendered explosive.

Why do the rays of the sun warm the air more in the valleys than they do on the top of high mountains? A. The air receives its warmth by contact with the earth; as the valley offers to the lower strata of air greater surface, the contact is more frequent and intimate. Something is also due to evaporation.

(22) H. A. G. asks: 1. Are glass tumblers made in molds? A. Yes. Many forms of glass ware are made by blowing into molds. 2. How is window glass made? A. In the manufacture of common window glass, the workman dips an iron tube into the melted mass, a portion of which adheres to it. This is blown into a pear shape, which becomes elongated by swinging like a pendulum. By reheating, blowing, and rolling, it is worked into the form of a cylinder, which is cut off around the top and bottom and split down the side. After again softening in the furnace, it is opened and spread out into a flat plate. 3. There is a recipe for crystal glass which states: White sand 15, red lead 10, refined ashes 4, and niter 1, parts. What are these parts? A. Parts by weight.

(23) D. H. R. asks: How can I relieve canaries from the attacks of a very small red parasite? A. Allow the birds to bathe frequently, and keep the cage very clean, with plenty of sand at the bottom.

(24) H. E. B. asks: 1. In re-sharpening files will any other kind of battery answer the same purpose as the Bunsen? A. Yes. 2. Will a zinc and porous cup battery, excited by nitric and sulphuric acids, be sufficient, and how many cups are needed? A. No doubt any kind of battery will answer the purpose, provided the electromotive force be equal to that of twelve Bunsen cells, the number employed by Mr. Werdermann in his experiments. 3. Are the files placed horizontally or in a perpendicular position? Should the positive pole connect with every file separately in the bath, or do they project above the bath and make a dry connection with the positive pole? A. Perpendicularly. The handle end of the file should project above the liquid, and connection may be made by means of a binding screw with the positive pole (copper or carbon) of the battery. 4. Will a small battery of medium strength be sufficient to sharpen a few files at a time, or even one, with a longer period of immersion? A. Possibly. The experiment is easily made.

(25) J. J. B. asks: I have been making some magneto-electric apparatus, and to insulate the wire I wrapped it with silk thread. Is there not a cheap silk thread made especially for this purpose? A. Yes. The wire is covered with raw silk floss, called untwisted silk for covering telegraph wire.

(26) I. J. S. asks: 1. Is there any way which will effectually destroy magnetism in the steel parts of watches, except passing them through the fire? A. There is no practicable method of destroying it. 2. Why do watchmaker's small tools get magnetized when there is no magnet about the shop? A. It is possible but not probable that the tools may have become magnetized by friction. It is more likely that your tools have accidentally got in contact with a magnet.

(27) M. D. says: Will you give me the simplest process of nickel-plating small objects like surgical instruments? A. Use chloride of nickel for a solution with a nickel positive electrode, and proceed as in silver plating.