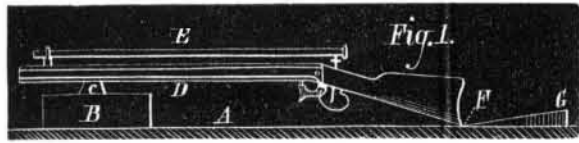


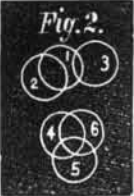
(33) H. E. K. asks: How are buckskin gloves, etc., cleaned? A. Wash them in lukewarm soft water, with a little Castile soap, oxgall, or bran tea, then stretch them on wooden hands, rub them with pipe clay moistened with beer; let them dry gradually, rubbing them from time to time so that they do not lose their shape in drying.

(34) G. asks: What are the ingredients of blue or mercurial ointment? A. Take prepared lard 1 lb., mercury 1 lb., prepared suet 1 oz. Rub them together in a marble mortar till metallic globules cease to be visible.

(35) A. H. H. says: In your answer to G. L. B. you say "the recoil of a rifle is felt before the ball leaves the barrel," which means, I suppose, that the recoil comes before the ball passes out of the gun. Not being satisfied with this answer, I made a few experiments, and the results do not fully agree with you. I tried an experiment as represented in the engraving. The rifle I used



had telescopesights and a hair trigger, and weighed altogether 7½ lbs. Caliber was 0.4 inch; the ball was 1½ inches long, and 70 grains powder was used. On a very firm table, A, was secured a block, B, high enough to bring the barrel, D, parallel with the table. At C, I fastened a yoke 4 inches long at right angles with the barrel, D, to keep the gun from turning over on one side when it was discharged. The stock rested on the table at F; and back of this was placed an inclined plane or wedge, as shown at G. I fired three shots, and in Fig. 2 have marked them 1, 2, 3. I then removed the wedge and fired three more shots, marked 4, 5, 6. At every discharge the recoil was so great that the rifle left the table entirely. You will see that there is only ½ an inch difference in the location of the bullet. By moving the gun back on the wedge ¼ inch, the sights are on the lower shots; and when on the table they are on the upper ones. Distance was 60 feet.



Why is it, if the recoil takes place before the ball leaves the gun, that there was not more difference in the shooting? A. The explanation of these experiments is probably somewhat as follows: As soon as the explosion of the powder occurs, a pressure is exerted in the barrel tending to impel the ball forward, and the gun backwards. If there is anything, such as a human shoulder, at the end of the stock, the recoil is felt at once; and if the shock is considerable, it is apt to injure the accuracy of the aim. If, however, the gun is free to move backward, as in the experiments made by our correspondent, it will commence to move at the same time that the ball does, under the influence of the same pressure; but being many times heavier than the ball, the latter acquires the velocity due to the pressure in a much shorter interval, and is out of the barrel when the gun, under the action of the same force, has just moved a little.

(36) S. S. asks: Please give me a recipe for crystallizing alum on a wire basket. A. Dissolve as much powdered alum in hot water as the water will hold; then suspend your wire basket in by a thread, and let it cool.

(37) W. H. asks: Does water, placed in a cup on the top of a stove, have any effect in purifying the air? A. No; but it prevents the excessive dryness of the air, which is very injurious to health.

(38) J. F. says: I have a gutta percha pocket drinking cup, and I broke one of the rings; can you tell me if there is any way to mend it? Glue would not hold it. A. Melt together equal parts of gutta percha and pitch. Apply hot.

(39) P. H. asks: Is there any method by which scale can be prevented from forming on the inside of a tubular boiler? A. The means of prevention vary with the qualities of the water. Unless the nature of the impurity be known, no specific can be recommended.

(40) D. T. S. says: I have noticed that in this section the willow trees all lean to the north. Can you tell me why? A. We think it is simply indicative of the average direction of the wind. Young willows grow quite rapidly, and their yielding nature makes them very sensitive to the slightest breeze.

(41) L. H. B. asks: How can I fire a charge with a battery? A. Solder a short piece of very thin platinum wire to copper wires leading from the battery to the place where the discharge is to be effected; place the platinum wire in powder or other explosive substance, and, when the proper moment arrives, include the battery in circuit. It is doubtful if one cell will be sufficient, certainly not unless the resistance of the circuit, including that of the battery, is very low. A large bichromate cell without porous cup would answer better than a Grove.

(42) F. M. asks: Can air be heated by electricity? A. Yes.

(43) G. F. B. says: The last two batteries I have made have not been successful. I use zinc and carbon plates. My solution consisted of sulphate of mercury 1 part, bichromate of potash 2 parts, sulphuric acid 4 parts, water 15 parts. When I first put the solution in the batteries, I got a very strong current of electricity; but after 15 or 20 minutes' use, it got very weak, and, after using a few times, the batteries would not work at all. The liquid turned to a greenish color, and there was a black sediment at the bottom of the jar. What is the matter? A. Single fluid bichromate

cells cannot be depended upon to furnish a steady current for any length of time. Their constancy, however, may be somewhat increased by causing air to bubble through the solution. Renew the solution, and brighten the connections.

(44) J. W. asks: 1. What is in the porous cup of a Léclanché battery? A. Peroxide of manganese. 2. If the magnet of a relay become partially magnetized, is there any way of drawing the magnetism out? A. Careful annealing is the only permanent way.

(45) J. C. L. asks: What is salt of steel? A. Probably muriate of steel, used in medicine, is intended by this term.

(46) G. W. F. says: I am building a small magnetic battery, and do not know how to arrange the wire to derive the currents from it. Can you help me? A. Make an ivory or hard rubber ring to go on the shaft, to this ring fit another of brass, and fasten the two together with screws; after which saw through the brass ring on opposite sides and in the direction of its length. The outer ends of the coils are then to be soldered to the semi-cylindrical pieces of brass, and two stiff springs, to which wires are attached for terminals, are made to press against the latter.

(47) O. P. asks: 1. Is there any metal that can be permanently demagnetized? A. Yes, tempered steel. 2. How is it done? A. By enclosing it in a helix in which a powerful electric current is circulating, or by rubbing it several times from its middle point to the ends with a permanent or an electro-magnet. Care must be taken to use opposite ends of the charging magnet for the different halves of the magnets to be charged.

(48) E. G. A. asks: Are there any cases on record where lightning passed down a lightning rod, when the rod, being tested, was found to be in good order, or (in other words) its resistance was small? A. We do not recall any at this moment; but as more or less electricity continually traverses all rods, cases might be found. Sometimes a very heavy charge destroys the efficiency of the rod; the defects, however, are usually apparent in such cases.

(49) J. A. R. asks: What is the reason that in electro-silverplating the silver blisters on the work and comes off in spots? A. All deposits are apt to blister and come off when the objects are not properly cleaned. 2. Where can a work on electro-silverplating and gilding be bought? A. Works on electro-deposition are obtainable at almost any of the large bookstores. Sprague's "Electricity: Its Theory, Sources, and Application" can be recommended.

(50) C. J. M. asks: 1. Can you give a recipe for varnishing the coils (outside) of an electro-magnet? A. Shellac is good, and is often used for the purpose. 2. In laying wires under carpets or other dry places, must the wires be insulated? A. It will answer to use uninsulated wires if the ordinary battery current is employed. Such wires are, however, apt to cause much annoyance by getting together and thus interrupting the circuit.

(51) J. W. E. asks: Is there any remedy for dreaming? A. When the digestive organs are in good order, and there are no external noises or other circumstances to excite dreams, sleep is seldom disturbed in this way; but any troubles in the alimentary canal are usually accompanied by painful dreams, more or less intense. Keep your body in health, and your rest will probably be uninterrupted.

(52) F. J. asks: What ingredients can we put into flour paste, for uniting two or more thicknesses of paper, and to stand the effect of steam? A. We do not know.

(53) K. asks: Suppose that a gas, condensed by pressure to a liquid form, is cooled by a refrigerating mixture to a considerably lower point than another quantity of gas likewise condensed, but which is at the ordinary temperature of the surrounding atmosphere. Will the first or cooled gas in expansion possess an appreciably greater capacity for absorbing caloric than the non-refrigerated gas? A. The gas which had undergone the greatest refrigeration would, upon the expansion to its original volume, absorb the greatest amount of heat, other things being equal.

(54) F. M. asks: What roots are used in medical practice, which have the property of giving a jet black color? A. Extract of logwood, walnut peels and shells, coppers and nutgalls are employed for staining black. We know of no single root that will give a satisfactory black stain.

(55) K. says: I saw in a recent issue of your valuable paper an answer to a correspondent who wished to obtain a colorless solution of salt of copper. If he will take strong aqua ammoniac, and place it with copper chips in a bottle, in a short time he will have a salt of copper in solution which, while exposed to the action of air, will be of a fine blue color, but, upon corking the bottle airtight, in a few hours will become colorless, until again exposed to the air, and so on. A. Our observations with regard to the ammonio-cupric oxide do not sustain yours.

(56) W. K. asks: Can lighting gas be made from nightsoil and dead animals, the gas being used, and the residue employed for fertilization? A. We think the gas would not be rich enough in hydrocarbons to be employed, and the residue would probably be badly carbonized.

(57) J. O. M. asks: Why are bricks made in Philadelphia so much richer in color than those made in Albany? A. It is due to the large proportion of red oxide contained in the material.

1. How is red oxide of lead made? A. It is obtained by roasting litharge at a temperature of about 500°, in contact with the air. 2. How is red oxide of iron made? A. The coarse pigment is obtained by pulverizing and igniting the red or brown hematite. The finer grades are prepared by precipitation of a solution of ferric sulphate or chloride with excess of ammonia, and washing, drying, and igniting the yellowish-brown hydrate thus produced.

(58) S. S. S. asks: What is the most durable paint to put on a steam pipe? A. There is a black varnish, made from petroleum, which answers as well as anything of which we have knowledge. We have received so many inquiries on this subject that we think it would be well for manufacturers of this varnish to advertise in our columns.

(59) S. H. B. says: 1. I want to make a steam engine boiler, to be 3 inches by 4 inches and 6 inches long. Would copper nearly as thick as cardboard do for the boiler? A. Yes. 2. Would a mixture of zinc and pewter do for the cylinder? A. Yes. 3. Is there any danger of a boiler bursting that is made of such copper? A. You should put in a safety valve. 4. Please explain how the steam gets from steam chest to cylinder. A. Through an opening or port, over which the valve moves. 5. How large must I make the different parts of the engine? A. Get a good drawing of an engine, and proportion the parts from that.

(60) F. D. says: 1. I have invented a tool for breaking slag in furnaces, and wish to know where it can be put to a very severe test. A. Take it to an iron foundry. 2. Is there much clinker formed in the furnace of steamers, and how is it removed? A. With some kinds of coal a great amount of clinker is formed. It is generally removed with a slice bar.

(61) P. L. V. H. says: My son, aged 19, is desirous of becoming a skillful engineer in the merchant marine; he has worked at the machine business some two years, is well up in mathematics, understands the theory of the steam engine, both marine and land, and can furnish testimonials as to character and ability. What course should he take to become fitted for the position of chief engineer on one of our large ocean steamships? A. His best plan will be to enter the merchant service in as good a position as he can obtain, and work his way up.

(62) R. K. asks: Is there a machine for carrying sand from a river bank to a boat at a distance from the shore? A. There is a sand pump in the market, working on the principle of the steam siphon. Such pumps were used in making the excavations for the Brooklyn bridge.

(63) W. Y. says: A friend says that when an engine is on the center the live steam port should be open. I say it should be shut. Who is right? A. Ordinarily it is advisable to have the steam port slightly open when an engine is on the center. This is called giving the valve steam lead. 2. He says that the right name for the crank pin is the wrist. I say the crank pin is correct. Who is right? A. Both terms are correct, that is to say they are both sanctioned by general usage. The term wrist pin, however, is more general in its application than crank pin.

(64) E. N. says: I have run a stationary engine for 13 years, but have no certificate. What should I have to pass an examination in to obtain one? A. It will depend upon the local laws of your State. Apply to an inspector.

(65) R. W. asks: 1. What is the proper area of steam passages for small engines up to 6 inches diameter? A. Make the area of your ports one eighth that of the cylinder. 2. When the diameter of cylinder, stroke of piston, and pressure are given, by what rule do you determine the number of revolutions which an engine ought to make? A. Calculate this from the duty to be performed. See p. 33, vol. 33.

(66) H. J. E. asks: I. How should wax be prepared for waxing stove patterns, and how should it be applied? A. Get the best beeswax; then slightly heat the castings, and rub them over with the wax, wiping off the surplus wax with a piece of soft rag.

(67) T. P. says: 1. I have to use a round cast iron sleeve, 9 inches long and 2¼ inches in diameter, with a square ¼ inch hole through the center of the same. The foundry where I now get my castings uses common sand or clay cores, which leave the corners of the holes rough. The holes must be smooth and straight. Baked cores are liable to warp. Is there not some better plan? A. Have the sand cores faced with plumbago. 2. Could an iron bar be prepared and used as a core, and yet come out of the casting when cold? A. An iron bar cannot be used.

1. How can I polish steel by hand? A. After fine filing, use emery cloth, then crocus, and finally rouge or polishing powder. 2. Is there any liquid used after polishing? A. No.

(68) B. F. S. asks: How shall I fill and polish church pews of ash, trimmed with walnut? A. The best way is to French polish them. See p. 11, vol. 32.

(69) P. D. says: In "Practical Mechanism," Joshua Rose says, of the boring bar with the adjustable cutter head, that it will bore a round hole, even though the bar may run out of true by reason of either or both of the centers being misplaced, or even though the bar itself may have become bent in its length. I should infer from this that he means to say that any other form of a boring bar would bore an oval or other irregular hole in similar circumstances. I claim that no form of boring bar will bore an unround hole by reason of being bent in its length or running out of true. The cutter that is farthest from the center will do all the cutting, but at the same time it will describe a true circle. A. A boring bar with a fixed

head will bore a round hole whether the bar runs out of true or not, providing the carriage carrying the work travels in a line with the center line between the centers on which the bar revolves; but if the bar runs out of true with the shears (as in case the back center of the lathe is set to one side), the hole bored will be oval, although the cutters revolve in a circle.

(70) C. F. asks: How can I extract the gold from emery paper which has been used to polish gold? A. If the paper be treated with a little mercury, the latter will remove all the gold, with which it forms an amalgam. If this amalgam be subjected to a strong heat in a small iron retort (the beak of which or its connection should dip beneath the surface of some cold water), the mercury will be vaporized, and, distilling over, be condensed in the water, leaving the gold behind in the retort. Avoid inhaling the mercurial vapor. It is very pernicious.

(71) F. H. F. asks: Please give me a rule for laying out eccentric gearing. A. Find the center of the hole in the eccentric, and then set the compasses to within half an inch of the extreme circumference of the eccentric part, and mark a line clear across; then find the center of that line, and draw a line from it to the center of the shaft hole, which line will be the throw line, on which a center should be marked at a distance of half the required amount of valve travel, measuring from the center of the eccentric hole; and from these centers mark circles of the required diameters to suit the shaft and the strap. All the marking should be done on the plain and not on the hub side of the eccentric.

(72) D. S. C. asks: How can I mix aniline red to put on leather, so that it will not turn dark when it is varnished with shellac? A. The darkening of color is probably due more to the substances used in tanning the leather than to the varnish. The common solvent is a mixture of equal parts alcohol and water.

(73) F. L. H. says: There is a gentleman at this place who uses old kerosene barrels to put cider in. He claims that a little cider will cleanse the vessel thoroughly, after which it can be used for packing pork and other things, without causing them any injury. The cider seems to have an action on the oil, if added to a portion in a bottle. Please tell me the chemical action by which this result is obtained. A. If this method is successful, it probably depends upon the slight solubility of the oil in the small percentage of alcohol contained in the cider.

(74) A. K. says, in reply to G. A. F.: It is very likely that calamine has been found in Oregon, as carbonate of zinc occurs very frequently in that Territory. But only a wet analysis will determine it.

(75) J. G. says, in answer to C. A.'s query as to the force of gravity deviating the ball from its direction of projection: This is always so, except when that direction is vertical. In firing at any object out of a vertical line, a certain amount of elevation must be given to make up for the distance through which the ball will fall (on account of its weight) between the instants of leaving the barrel and striking the object.

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

B. C.—It is Prussian blue.—T. L.—It is red hematite, a good iron ore, but it contains considerable siliceous matter.—W. P. C.—The name of the plant is *apios tuberosa*, a genus in the natural order *leguminosæ*. Its common name is ground nut or wild bean. The tubers are edible, but their value as food has not been determined. The brown-purple flowers are fragrant, and the plant is quite common in moist thickets in New Jersey.—L. B. D.—It is a fine crystal of sulphuret of lead or galena.—H. W. C.—It is lead ore of good quality.

J. P. O'C. says: I am tending a steam hammer, the weight being 4,000 lbs., including drop and piston. The inside diameter of the cylinder is 18 inches, and the hammer has a drop of 3½ feet. How many lbs. will it strike without steam on top, and how many lbs. will it strike with 90 lbs. of steam to the inch?—C. E. B. says: A roller weighing 112 lbs. is supported on an inclined plane, the gradient of which is 1 foot in 2, by a force which acts along its slope. What is the magnitude of this force, and what is the pressure on the plane, friction not being taken into account?

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects:

On the Interstellar Space. By —, and by T. H.  
On Whistling. By H. B. N.  
On the Washington Monument. By J. M.  
On Skinning the Rhinoceros. By N. G. P.

Also inquiries and answers from the following: A. N.—R. K. McM.—R. W.—C. J. J. R.—C. D. B.—J. G. B.—J. J. R.—W. A. H.—R. F. R.—T. M. C.—T. V.—W. M.—C. P. H.—J. O' B.—H. J. R.—P. & K.—D. M.—C. D. B.

HINTS TO CORRESPONDENTS.

Correspondents whose inquiries fail to appear should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them. The address of the writer should always be given.

Enquiries relating to patents, or to the patentability of inventions, assignments, etc., will not be published here. All such questions, when initials only are given, are thrown into the waste basket, as it would fill half of our paper to print them all; but we generally take pleasure in answering briefly by mail, if the writer's address is given.