THE SCIENTIFIC USE OF COMMON THINGS.

Some time since, the relationship of toys and science was treated in this journal. It is possible to go still further in the same direction. Scientific facts and principles may often be illustrated by means of common things, such as may be met with in everyday life.

Pins, needles, sticks, straws, bullets, bottles, hair pins, rubber bands, marbles, are among the things available for experimental purposes. Even a hand saw may be pressed into the service of scientific illustration.

The first figure of the engraving illustrates a piece of apparatus which is doubtless better known to the school boy than the professor. The writer's attention was first called to this instrument by a professor of physics who confiscated it from a student and used it in a lecture as an illustration. It consists of a board into which are driven eight common pins which are allowed to project different lengths, thus forming a musical instrument which may be played by plucking the heads of the pins. The instrument is tuned by driving the pins into the board more or less. In this experiment it is shown that there exists a certain relation between the length of the vibrating pin and the pitch of the sound it produces. In Fig. 2 is shown a zylophone, a musical instrument formed of bars of wood of different lengths and thicknesses. The particular instrument here illustrated was made of a piece of a pine box cover split up in a haphazard way and tuned by shortening to increase the pitch and reducing in thickness or notching at the center to lower its pitch. The bars are supported by a loosely twisted cord. The sound is produced by striking the bars at their mid-length with small mallets.

In Fig. 3 is shown a modification of Savart's wheel, which is in reality no wheel at all, but the effects secured are substantially the same. By drawing the edge of a card slowly along the cutting edge of a fine saw, regular taps are produced, which do not form a musical sound; but when the card is drawn along quickly, the taps are made with sufficient frequency to produce a sound, the pitch of which will vary, of course, with the rapidity of the movement of the card.

In Fig. 4 is illustrated an experiment with a paper tube, illustrating the closed and open organ pipe. When the end of the tube is struck smartly with the palm of the hand, if the hand is allowed to remain in contact with the end of the tube, the air in the tube will be set in vibration, and a tone will be produced which is due to a closed pipe of that length. If, however, the hand is instantly removed from the tube after the blow, two notes will be heard, one due to the closed pipe, the other to the open pipe, and the latter will be an octave higher than the first.

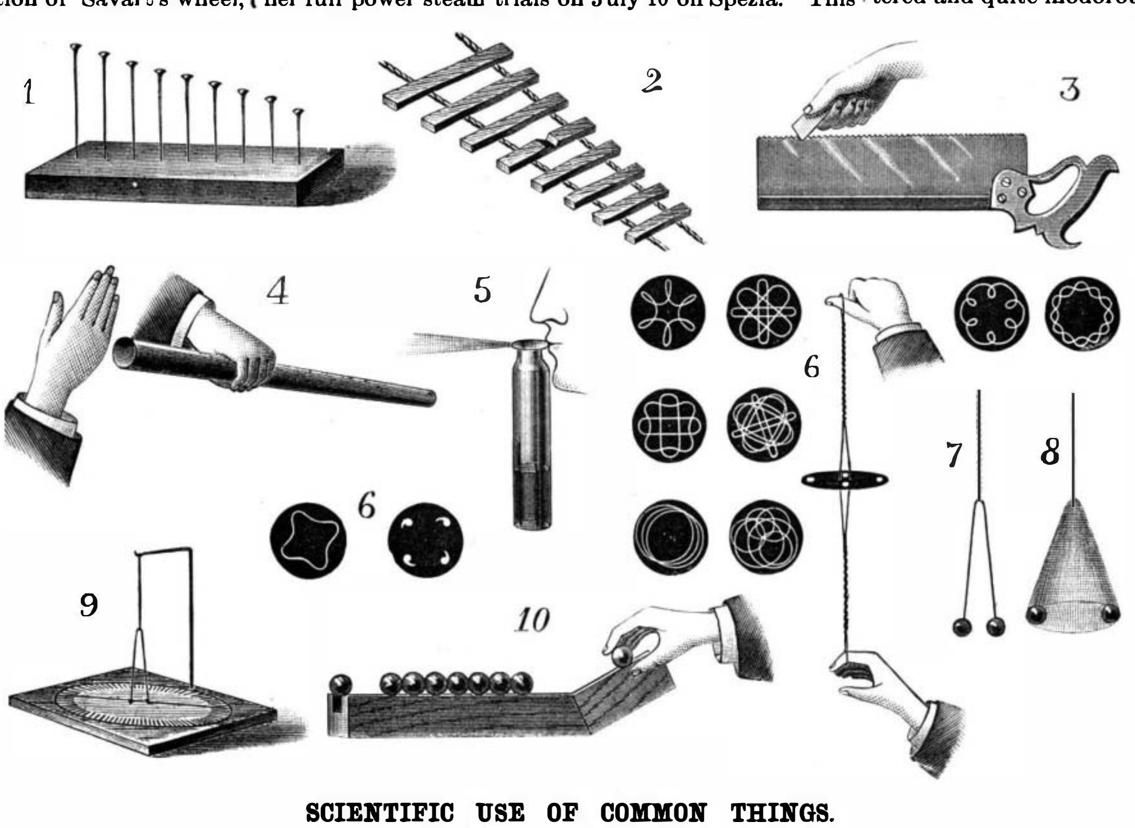
In Fig. 5 is an experiment with a vial, which is made to answer as a closed pipe, the length of which is varied by pouring in water. By blowing across the mouth of the vial, a sound will be produced which varies in pitch with the length of the air space above the water. By closing the mouth of the vial more or less by the under lip, it is found that this also changes the pitch; the smaller the opening of the mouth of the vial, the lower the pitch.

In Fig. 6 is shown a toy which is interesting on account of the great variety of intricate figures it can produce. It consists of a disk of black cardboard, having two holes near and on opposite sides of the center, an elastic cord inserted in these holes, and four paper fasteners or bright brass nails inserted in the disk at four points equally distant from the center of the disk and from each other. This toy is used in the same manner as the well known buzz, by twisting the cord and drawing upon it, and while the disk revolves, first in one direction and then in the other, the cord is made to vibrate laterally. Some of the figures which may be produced in this way are shown in the engraving. These effects are due to persistence of vision.

In Figs. 7 and 8 is shown a simple device for illustrating centrifugal force. Two bullets split to the center are closed together upon the ends of an ordinary hairpin, and the latter is suspended by a small rubber band. The band is twisted and then allowed to untwist, thus imparting a rapid rotary motion to the hairpin, which causes the bullets to fly out by centrifugal force as shown in Fig. 8. The momentum acquired by the bullets during the untwisting of the rubber band twists the band in the opposite direction, so that when it untwists again, the apparatus will rotate in the opposite direction. This operation will continue for a considerable time.

In the apparatus shown in Fig. 9, hairpins are again pressed into service. One is opened out at a right angle, forming a standard; another is bent up at the ends, forming a double hook. The standard is inserted in a baseboard provided with a graduated circle. The double hook is suspended from the standard by a short piece of twisted catgut cord, and in the double hook is placed a small knitting needle to serve as an index. This forms a hygroscope, which is quite sensitive to atmospheric moisture. By substituting a filament of silk or a fine hair for the catgut cord, the double hook may be used for supporting a straw to show electrical attraction and repulsion, a stick of sealing wax or a glass rod being used to produce the electricity.

The apparatus illustrated by Fig. 10 shows the elasticity of solids. Two pieces of "matched stuff" are mitered together, as shown, to form an inclined plane and a guide for marbles or lead bullets. A number of marbles are placed in the groove in the horizontal guide and another marble is allowed to roll down the inclined plane. The blow thus imparted to the first of the series of marbles is transmitted through the entire series to the last, which is thrown forward. This action is due to the compression of the marbles by the blow and their restitution by their own elasticity to their original form. When lead bullets are substituted for the marbles, the force of the blow is expended in permanently changing their form.



SCIENTIFIC USE OF COMMON THINGS.

The Andrea Dorea.

The new Italian battleship Andrea Dorea underwent her full power steam trials on July 10 off Spezia. This vessel, the Ruggiero di Lauria, and the Francesco Morosini form a group very similar in design to the Admiral class of the British navy. They are of 11,000 tons displacement, 328 feet long, and 65 feet 4 inches beam. Their engines, 10,000 horse power, were intended to give them a maximum speed of 16 knots. The armament exceeds anything we have hitherto attempted, or are likely to attempt, consisting as it does of four 110 ton Elswick guns, mounted in two barbettes, two 6 inch quick-firing guns, and twelve machine guns. The machinery of the Andrea Dorea and the Ruggiero di Lauria is by Messrs. Maudslay, Sons & Field, Lambeth, and is of the three-cylinder inverted with triple expansion type, working twin screws, and fitted with Joy's patent valve gear. Steam is supplied by eight large double-ended boilers, arranged in close stokeholds. The Andrea Dorea left the Gulf of Spezia at 10 A. M. Everything worked well, and an air pressure in the stokeholds of only three-fourths inch was found quite sufficient to maintain the power required. The result of the day's run was a mean horse power of 10,500, and an average speed of 16·1 knots. The coal was unpicked and the stokers were Italian.

Precautions against Consumption.

In a circular on precautions against consumption, published by the State Board of Health of Pennsylvania, the following advice is given: "The duster, and especially that potent distributer of germs, the feather duster, should never be used in a room habitually occupied by a consumptive. The floor, woodwork, and furniture should be wiped with a damp cloth. The patient's clothing should be kept by itself, and thoroughly boiled when washed. It need hardly be said that the room should be ventilated as thoroughly as is consistent with the maintenance of a proper temperature."

The Human Subject Forty Years under Water.

A very interesting report has just been issued by Dr. Konig, "Gerichtsarzt" (judicial physician) of Hermannstadt, on the state in which the human subject, after forty years' immersion in water, may be found by the physiologist. In the revolutionary upheaval of 1849, a company of Honveds, as the Hungarian militia are called, having fallen in the vicissitudes of war, were consigned to the waters of the Echoschacht, a pool of considerable depth not far from Hermannstadt. After some forty-one years their bodies have been brought up again to the light of day, and subjected to a careful and minute investigation from the physiologist's point of view. Dr. Konig found them in perfect preservation, without a single trace of any decomposing process. Externally they had the appearance of having been kept in spirit, like so many preparations in an anatomical museum. The epidermis was of a whitish gray color, the muscles rose red, feeling to the touch like freshly slaughtered butcher's meat. All the inward parts—the lungs, the heart, the liver, the spleen, the kidneys, the bladder, the stomach, the alimentary canal—were of the consistence of those in a newly deceased corpse, while the brain was hard, of a dirty gray color, as if preserved in spirit. Structurally, the organs retained their outline perfectly, and were so easily recognizable in tissue as well as configuration that, according to Dr. Konig, they might have been exhibited for "demonstration" in an anatomical lecture room.

After forty-one years under water this is indeed a remarkable phenomenon. The large intestine contained fæces of a yellowish brown color, quite unaltered and quite inodorous, while the bladder was partially filled with straw-colored urine. But perhaps the most significant feature disclosed by these corpses is the following: In their interior abundant chloride of sodium, crystallized in cubes, had been deposited and fixed on the several tissues and organs, and these salts had not penetrated, mechanically, into the dead bodies from without. In the completely closed and perfectly unimpaired pericardium of the corpses on the inner pericardial aspect, and also on the outer surface of the heart itself, salt crystals of the same kind, to a weight of five grammes, were found adherent. This, according to Dr. Konig, clearly shows that, in the water, particles held in solution may pass through the skin and the muscles, and find their way into the most deeply seated organs. Herein, he adds, we have confirmatory proof, if such were needed, that the specific virtues of mineral baths exercise in this way their salutary effect on the internal economy of the invalid bather. There is a notable difference, however, between the time spent in the bath by an ordinary bather at a "Curort" and the forty-one years during which the Honveds remained under water. The phenomenal stillness of the Echoschacht may also have been a material factor in this impregnation of the corpses with chloride of sodium. But, with every allowance for such considerations, Dr. Konig has furnished a striking illustration of the permeability of the immersed human subject to salts in solution, and we hope his painstaking researches will lead to others in the same important direction.—*The Lancet.*

British Wrecks.

The number and tonnage of British vessels respecting whose loss reports were received at the Board of Trade during the month of July, and the number of lives lost, are as follows: Sailing, 45; tonnage, 6,048; lives lost, 53. Steam, 8; tonnage, 10,864; lives lost, 205. One hundred and thirty-three lives were lost in the Quetta and seventy-two in the Gulf of Aden. The above is a record of "reports received," and not of wrecks which occurred during the month. Casualties not resulting in total loss of vessels and the lives lost by such casualties are not included.

A DAM, to develop 20,000 indicated horse power, is to be constructed across the Missouri River, near Helena, Mont. It will be a timber crib structure 47 ft. high and 800 ft. long, forming an impounding reservoir with an area of 429 miles. The water will be taken from above the dam to the turbines by a tunnel 15 ft. by 17 ft. cross section driven through a rock promontory. The total cost is estimated at $100,000. The power developed is to be transmitted electrically to Helena, thirteen miles distant.

The Cost of Running a Twin Screw Passenger Ship.

What does it cost to run a palatial twin screw racer across the Atlantic? That is the question which the *Sun*, for the enlightenment of many inquiring readers, recently put to the New York agents of several big steamship companies. The questioner was about to file the query away with a lot of other unsolved riddles of the sea, when he strolled into the office of the Hamburg-American line. There he obtained the information which had been withheld at every other office. Agent E. L. Boas dissipated, as well as he was able, the mystery that had enshrouded the little problem. A midsummer trip of the magnificent Normannia was the theme of his calculation. The Normannia is not quite as big as the twin screw boats of the White Star and Inman lines, but her expense account, owing to the greater length of her voyage, is just as formidable. The cost of running her from her dock in the Teutonic town of Hoboken to her dock in the town of Hamburg, no less Teutonic perhaps, is about the same as the cost of running the City of Paris from New York to Liverpool.

When the Normannia starts on an eastward voyage she carries nearly 3,000 tons of coal in her protected bunkers. Some of this is American and some foreign soft coal, and it costs about $3.50 a ton. The sooty stokers daily shovel into her roaring red furnaces between 250 and 300 tons. The expenditure for coal runs just short of $1,000 a day, or nearly $8,000 for the voyage. The cost of the gallons and gallons of oil used to keep her ponderous triple-expansion engines, her dynamos, her numerous smaller engines, her pumps, and so on, running smoothly, combined with the coal bill, is quite $8,500.

The salaries of the big ship's company are not an unimportant factor in the expense account. Among the 300 persons who look after the working of the racer and the comfort of her passengers, are, besides cool-headed Capt. Hebich, 8 officers, 1 surgeon, 25 engineers and machinists, 2 pursers, 5 boatswains, 28 seamen, 114 firemen, 65 waiters and waitresses, 22 cooks, bakers, and assistants, 2 carpenters, 1 barber, and 14 skilled musicians. The total wages of these for a trip of eight days is about $2,000, not counting perquisites.

Capt. Hebich receives the highest salary. It varies between $3,000 and $4,000 a year, and depends somewhat on the earnings of the ship, of which he receives a small percentage. This is the way the skippers of all the colossal racing craft are paid, and it is not likely that any of them are going to cease racing, or to be censured for it, as long as a fast trip means money in their pockets and in the coffers of their company. Every hour the captain of the City of New York saves means a saving in coal alone of $50.

Next in importance to the captain of an ocean speeder is the chief engineer. He is not as frequently visible to the cabin passengers as his gold-laced superior, and nobody makes much fuss over him, but he is, in the opinion of his employers, a very big man indeed. He is the man who makes the great ship "git up and git." He submits daily reports of how things are going on down below to the captain. He tells how many tons of coal he is using, how much indicated horse power he obtains, and the number of revolutions the ship's propellers make a minute. If he doesn't get as much speed out of the clanking twin giants as the captain thinks he ought to, the captain pats him on the back and tells him to whoop her up, like a good fellow. It is essential to the captain's interest that he should be friendly with the boss of the mighty machines. For his great work the chief engineer receives $160 a month and his board, which is equal to that of the cabin passengers. The chief officer receives $80 a month, which is more than the captains of many steamships of the second class get.

The food and drink consumed by passengers and crew during a recent trip of the Normannia cost about $16,000. This is the complete list of the things that were necessary to make life aboard the luxurious floating hotel something like a dream. Two thousand five hundred bottles of red wine, 2,000 bottles of Rhine wine, 2,000 bottles of champagne, 1,200 bottles of cordials, 15,000 bottles of beer, 80 kegs of beer, 400 bottles of ale and porter, 2,500 bottles of mineral water, 37,000 gallons of drinking water, 70,000 pounds of potatoes, 16,000 pounds of beans, peas, and so on, 2,500 cans of fruit, 1,500 pounds of jellies, tarts and biscuits, 45 baskets of vegetables, 7,000 pounds of butter, 1,200 pounds of cheese, 10,000 eggs, 3,500 pounds of sugar, 1,500 pounds of coffee, 1,000 pounds of tea, 250 pounds of chocolate, 150 gallons of milk, 10,000 apples, 1,200 oranges, 1,000 lemons, 400 glasses of preserved fruits, 120 barrels of flour, 65 gallons of ice cream, 17,000 pounds of beef, 12,000 pounds of mutton, 1,800 pounds of ham, smoked beef, and bolognas, 1,000 pounds of veal, 700 pounds of bacon, 600 pounds of pork, 600 pounds of game, 500 pounds of canned meat, 250 pounds of lamb, 30 barrels of preserved meat, 20 barrels of salt pork, 16,000 pounds of fish, 450 chickens, 180 ducks, 60 turkeys, 60 partridges, and 50 geese.

From the foregoing facts and figures it may be said that one trip of the Normannia costs the Hamburg-American line not less than $25,000. To offset this expenditure, which does not include the cost of insurance, the Normannia must carry many passengers and some freight. The number of her passengers varies, of course, according to the season. She carries in midsummer sometimes nearly 500 first and second cabin and about 300 steerage voyagers. The average price of a first cabin passage is about $110, and that of a second cabin about $60. The average price of steerage accommodations is $22. The receipts from all classes of passengers on a good midsummer trip are over $50,000. Usually the Normannia carries 800 tons of freight, which, at the transportation rate of about $10 a ton, amounts to $8,000. The cost of loading and unloading this freight is borne by the company. In the dull season, the big twin screw ships do not make much, but their receipts throughout the year are large enough to warrant the declaration that they are great successes financially, and that they are the passenger ships of the future.—*N. Y. Sun.*

Electricity in Insects.

M. Nicolas Wagner, by a series of experiments displayed before the Academy of Sciences, about the year 1865, showed that electricity produced variation in the color of butterflies. His experiments were performed on *Vanessa urtica*. He found that electric currents changed reds into orange, and blacks into reds, and with a constant battery, a weak current produced spots varying in shape with the strength of the current. He further demonstrated that the colors naturally existing in the butterfly's wings were due to currents in that organ, the most powerful of which passes from the attachment of the wing outward along the middle nervure to the outer edge. In these experiments he used a Bois-Reymond galvanometer of 20,000 coils. The following are the conclusions he arrived at: 1. The existence of fixed electric currents in the wings of insects. 2. The possibility by means of electric currents to provoke a change in the shade and disposition of the coloring matter. 3. And the possibility, by means of these currents, to produce a kind of atrophy and to change the shape of the wings. He concludes as follows: "With these facts as basis, I propose to pursue my research on this subject."—*Sci. Gossip.*

SPEAKING of the difficulties of ship building in this country, *Industries*, of London, says: "Usually, American labor costs 50 to 100 per cent more than the same description of labor in England."

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.

(2408) W. H. S. writes: Will you kindly state in your answers to correspondents which is the best vessel to mix bichromate soda solution in? I mix 6 gallons at a time; 1 gallon water, 2 pounds sulphuric acid, 1 pound bicarbonate soda. I first used a beer keg, but found the action of the acid on the wood weakened the solution. Next tried demijohn, but being impatient and in a hurry with my acid, I broke the demijohn. How would an earthenware glazed crock answer? How would it do to line it with sheet lead? Would the chromic acid affect the lead? What sort of a faucet would answer to put in the crock so as to be the least affected by the solution? A. Use a stoneware glazed vessel. If you wish a faucet, stoneware or glass faucets may be used. A siphon of one of the mechanically changing type may be used. Do not attempt to charge with the mouth by suction, as the acid may enter the mouth.

(2409) N. B. asks: 1. What is the candle power of a gas jet? A. From 12 to 30 candles. 2. What is the ratio of volts, amperes, and ohms? A. It is deduced from Ohm's law: amperes=volts divided by ohms. 3. How many ohms will a thirty-volt battery overcome? A. Any number. 4. What resistance has No. 9 copper wire? A. 0·824 ohm per 1,000 feet. 5. What size wire should be used with a 30 volt battery? What is the resistance? A. It depends on the internal resistance of the battery and on the length of wire and other factors. 6. What is the cost per hundred feet? A. It weighs 39½ pounds per 1,000 feet, and is worth about 20 cents per pound. 7. Can you recommend some work on the measurement of electrical force necessary for certain work? A. Munro & Jameson's Pocket Book of Electrical Rules and Tables, price $2.50. 8. Is there any method of taking ink stains from wood? A. Wash with oxalic acid. 9. What is the cost of Edison lights? A. 75 cents each for standard size. 10. Please give me the numbers of the SCIENTIFIC AMERICAN SUPPLEMENT containing descriptions of batteries? A. Nos. 157, 158, and 159, besides a great many others.

(2410) J. A. B. writes: 1. I wish to use a cement (resinous) of a heavier specific gravity than water, and melting at 212°. Could you give me a formula? A. A formula for exactly 212° cannot well be given, as resins vary in their melting points. We would suggest simple shellac or ordinary sealing wax. 2. How can ordinary resin be deodorized? A. No practical method can be given. 3. How many ounces bichromate of potash are required to render 16 fluid ounces of glue insoluble? A. Dissolve 5 to 10 parts white glue in 90 parts water. Dissolve 1 to 2 parts bichromate of potash in 10 parts water. Mix the two solutions; use at once or preserve in tin boxes. Expose to light after applying, to bring about insolubility.

(2411) H. M. writes: Can you tell me what causes sweat or emitting moisture on a looking glass when exposed to sudden change of atmosphere, likewise metal vessels? Do you know any preventives? A. The trouble you refer to is due to condensation of the moisture of the air. One preventive is to rub a little glycerine over the surface, and this is not permanent, and the remedy may be worse than the original trouble.

(2412) C. D. F. writes: Can you send me a paper giving a method of coating wood with copper by means of battery? I have tried coating with black lead and wax, and the current does not seem to run, although I connected the ends of the copper wire to the wood by black lead and wax. I also tried coating the wood with bronze powder and wax, and the current did not run over the wax. The battery was all right, as I plated other metallic substances at once with it. I used a sulphate of copper solution, and I also used a verdigris solution, and neither worked on wood. Can you tell me where the trouble is? A. In preparing wood for plating use no wax, but rub over well with plumbago. If this does not suffice, rub or sprinkle some fine iron dust over the plumbago-coated surface to start the deposition of the copper. Your trouble probably was in not using enough plumbago, and perhaps you did not use enough unmixed with wax upon the surface.

(2413) W. D. A. writes: Do you know of any simple and inexpensive method by which any one not an expert can find out whether or not cider vinegar is pure? A. Place some white sugar in a saucer, half fill with vinegar, and evaporate to dryness by placing on top of a boiling water kettle. If the sugar turns black, the vinegar contains an adulterating acid. This test is of course not universal, but is very simple and useful.

(2414) E. H. asks how chewing gum is made. A. The simplest is made from paraffine wax melted with a little olive oil and glycerine. The latter must vary in amount with the character of the wax.

(2415) D. W. G. asks how to cut burnt grease off an engine so it will be bright and show the steel as before. A. Try caustic soda solution. Otherwise clip it off with a sharp chisel, following with emery cloth.

(2416) W. S. asks for the process of frosting an incandescent lamp by hydrofluoric acid. A. The best method is to expose the lamp to the vapor of the acid. Cover all metal parts with wax, and suspend in a covered wooden or pasteboard box on whose bottom is placed a leaden tray containing powdered fluoride of calcium fluorspar mixed with oil of vitriol. Avoid getting any of the mixture on the hand. The etching should not be carried too far, or it will lose the "frosting" effect. A very small quantity of materials will suffice.

(2417) J. D. McC. writes: Will you give me the formula for water-marking paper? A. It is done in the factory by placing wire designs under the pulp when drying and setting.

(2418) F. W. F. asks (1) what the best method is for covering heavy muslin to make it waterproof for a tent. A. Use paraffine wax melted in with a hot iron. 2. How the starch is fixed that they use in laundries to get the right gloss. A. Principally by heavy polishing irons or their equivalent. A little paraffine wax may be added to the hot starch. 3. What are the best acids to use for engraving names on steel? A. Sulphuric or nitric acid diluted with three to five volumes of water.

(2419) W. O. asks for a solution for gold and copper plating without a battery. A. For mercury gilding see query 2365. An ethereal solution of perfectly neutral gold chloride is sometimes used for steel. The following is perhaps of more general use. Gold chloride 9 parts dissolved in 1,000 parts water, add 360 parts bicarbonate of potash and boil for two hours. The article to be gilded, if of copper, is immersed in the boiling fluid until gilded. If not of copper, a piece of copper is held against it in the fluid until it turns copper color. Then the copper is removed and the gilding is finished. For copper plating immerse the article in a solution of copper sulphate. If of iron, a few minutes will coat them. If not coated, then battery action is required. This may be brought about by placing a piece of iron in with the article held in contact with it.

(2420) E. B.—For an ice house the walls should have a thickness of twelve inches of well packed sawdust, floor and roof the same, so that the entire body of ice is inclosed and protected in twelve inches of saw dust. There should be a ventilator in the roof, and good drainage below the floor.

(2421) J. D.—In issue of August 9, 1890, in answer to H. V., No. 2367, I would say, in plaster of Paris, to prevent rapid setting or hardening, use dissolved glue, according to length of time wanted to harden.

(2422) A. asks: Does the muriatic acid and lead with which a hole in a tin pan is soldered injure the food which is cooked in it (the pan) afterward? A. Not if the pan is in constant use. If put away after soldering the acid may dissolve tin or may contain zinc in solution. In either case, cleaning before use would dispose of the trouble.

(2423) J. A. B. asks (1) how to make a good silicate of soda paint, such as backgrounds are painted with, and how the different shades are obtained. A. Dilute silicate of soda solution until it works well with the brush, and add dry coloring matter, such as will not be decomposed by the chemical. Ochers, Venetian red, smalts, umbers and siennas may be employed. 2. How to frost the glass in my skylight. A. Rub over with a little bag of muslin filled with fine sand, powdered glass, or grindstone grit and water. Some sand may be placed directly on the glass. 3. A good water and acid proof coating for wooden trays. A. 4 parts resin, 1 part gutta percha, and a little boiled oil melted together. 4. How to make a good liquid glue? A. To ordinary glue melted with as little water as possible add enough acetic acid to reduce to proper consistency.

(2424) H. E. R. asks: 1. Can the standard supporting the revolving disk be made of hard wood and can the ring of vulcanite which surrounds the glass disks be made of wood? A. The parts of the machine mentioned may be made of wood, provided it is very dry and well soaked in paraffine. 2. How are the clamps fastened to the glass of the tubular shaft? A. By means of a cement formed of equal parts of pitch, gutta percha, and shellac melted together. 3. Do the sector plates of brass rub on the glass of the other revolving disk which revolves alongside of it? A. The sector plates are upon the outer surfaces of the glass disks, consequently they cannot go into contact with each other. 4. What is the price of the Wimshurst, Holtz, and Toepler and Winters machines? Where can I get a catalogue of those machines? A. For this information, write dealers in electrical apparatus who advertise in our columns.

(2425) J. K., J. C. O., and others.—To tan or taw skins with the hair on for rugs and other uses, first thoroughly wash the skin and remove all fleshy matter from the inner surface, then clean the hair or wool with warm water and soft soap, and rinse well. Take ¼ pound each of common salt and ground alum, and ½ ounce borax, dissolve in hot water, and add sufficient rye meal to make a thick paste, which spread on the flesh side of the skin. Fold it lengthwise, the flesh side in, the skin being quite moist, and let it remain for ten days or two weeks in an airy and shady place, then shake out and remove the paste from the surface and wash and dry. For a heavy skin a second similar application of the salt and alum may be made. Afterward pull and stretch the skin with the hands or over a beam and work on the flesh side with a blunt knife.

Replies to Enquiries.

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

(2426) *How to Make a Small Emery Wheel.*—Your answer to S. A. A. (2385), 23d of August, How to make small emery wheels, is not good. The emery will peel off. Cover the wheel with heavy muslin, sewed or glued on, then glue and roll in emery, and you have a coat that will stay. I use wheels from ⅛ to 1½ inches in diameter made in this way and they work well.—J. S. Chandler.