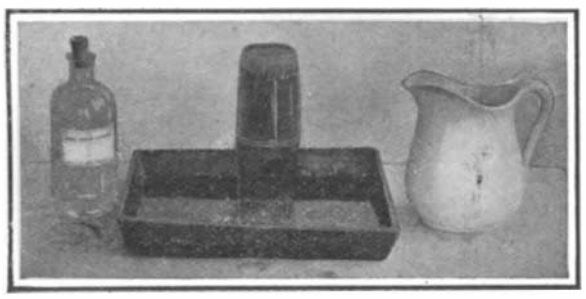
Handy Man's Workshop

POROSITY OF LIQUIDS.

BY A. R. VAN DER VEER.

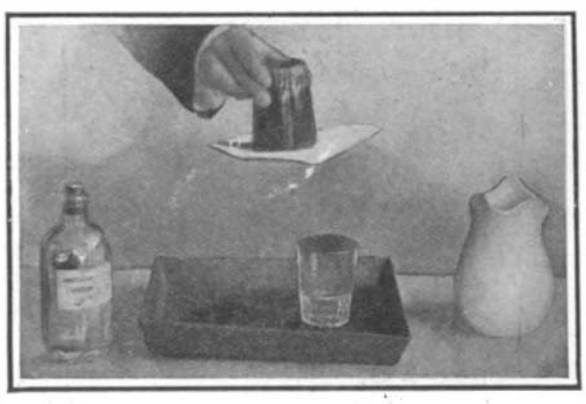
It is rather difficult to imagine liquids as having pores, though this seems to be the case as shown by certain familiar experiments. When a certain amount of powdered sugar is slowly poured into warm water, the water will dissolve the sugar and appear to absorb it without increasing its volume. Similarly, when alcohol is poured into water, the resulting volume



ALCOHOL "SOAKING" INTO WATER.

will be less than the sum of the two volumes.

For instance, if fifty parts of water and fifty parts of alcohol be mixed together, they will make only ninety-four parts. Apparently one of the liquids has entered into the "pores" of the other. This experiment as commonly performed in physics laboratories consists in putting measured quantities of the two liquids together, but the effect would be far more striking were it possible for students to see one of the liquids actually "soaking" into the other. This can be done in the following way: Take two glasses, one filled to the brim with water, and the other with alcohol. In order to show the effect to better advantage, color the alcohol with red ink. The glasses should not be over-full; that is, the surface of the liquid should not bulge above the rim of the glass. When everything is ready, place a sheet of paper over the glass full of alcohol, and with a hand on the paper to keep it down on the rim of the glass invert the tumbler, and the liquid will remain in the glass, owing to the air pressure on the paper. Now place the inverted tumbler over the glass full of water, and carefully draw out the paper. This can be done without spilling a drop of alcohol, and yet as soon as the paper is removed, the alcohol will commence to drop. Owing to the fact that it is colored, it is possible to see the alcohol actually "soaking" into the water, while tiny air bubbles that were formerly contained in the "pores" of the water rise slowly to the top of



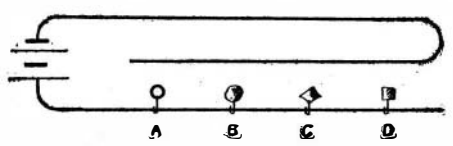
INVERTING THE GLASS FULL OF ALCOHOL.

the tumbler. This will continue for some little time until a considerable air space forms in the top of the tumbler.

PLATING SPOONS AND FORKS AT HOME.

BY A. J. JARMAN.

In the home of every handy man there are generally some forks or spoons that have become somewhat the worse from wear. Every such article if in a moderately good condition is worth replating, and if the work be done at home as much silver can be deposited as one desires, so as to give a coating that will last for years. The following directions will enable any handy man to silverplate his own goods in a very satisfactory manner, with such silver as there happens to be about the house, such as an old silver watch case, a badly worn solid silver spoon or two, or an out-of-date bracelet, in fact any old piece of silver that has no especial use. Of course if this commodity does not exist, it will be necessary to buy an ounce and a half of pure granulated silver at about sixty cents per ounce. Assuming that the old silver mentioned is to be had, proceed as follows: Procure a small stoneware pot of about one or two quarts capacity. Weigh the silver—there should be about two ounces. If there are any iron or steel rivets or rings about the watch case, or any German silver parts, break them off with a pair of pliers. Place the silver in the crock, pour upon this four or five ounces of nitric acid (chemically pure) of a strength known as 38 deg. Place the crock into an enameled tray. Pour some hot water into the tray, to aid the chemical action. Place a sheet of glass upon the pot, or a stoneware lid if it is provided with one, then stand the pot out of doors, because the fumes that are given off are poisonous. In the course of half an hour, all the silver will have become dissolved. Now fill the pot half full of cold water, to dilute the nitrate of silver that has been formed. The liquid will present a bluish green appearance, due to the copper contained in the old silver articles. Take four ounces of hydrochloric acid, and add to it four ounces of water. Then pour this into the silver solution. Stir vigorously while this is being added, with a clean glass strip. The silver will now be thrown down as chloride of silver, in the form of a dense white precipitate. Let this stand for about two hours, to allow the chloride of silver to become precipitated; carefully pour off the clear bluish green liquid, without disturbing the precipitate. Fill the pot again with clean water, stir well, and let it subside again for a couple of hours. Repeat this four times. This operation will free the chloride of silver of the dissolved copper, also the result of chemical decomposition. If pure granulated silver is used proceed in the same way, only in this case there will be no copper impurities to be gotten rid of. Procure a three-gallon crock, with plain upright sides; pour the chloride of silver into this, wash out every scrap of chloride. Pour these washings into the crock, then dissolve half a pound of cyanide of potassium in the jar that the silver was dissolved in. The cyanide must be that known as 99 per cent commercial, three pints of water being used. When completely dissolved, pour this upon the chloride of silver, keeping in reserve



CONNECTIONS FOR AN OBLONG PLATING TANK.

about half a pint of the cyanide solution; stir the mixture with a glass strip; wait a short time, and then, if the chloride has not become completely dissolved, add a little more cyanide solution. When the chloride is completely dissolved add not more than four ounces of the cyanide solution; this will give what is known as free cyanide. Add a quart of water; stir and allow this liquid to stand twenty-four hours. This will allow any dirt, also a small portion of carbon from the cyanide, to subside. Very carefully pour off the clear liquid; drain this off; return the clear liquid to the crock. After rinsing the crock out make the quantity of liquid up to two and a half gallons. This is the silver-plating fluid.

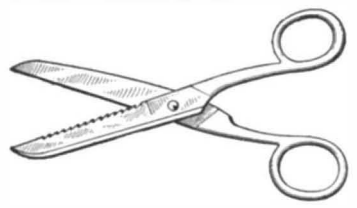
A two-cell Fuller mercury-bichromate battery will be just the thing for plating. Take a stout piece of copper wire, bend it in the form of a ring, so as to extend around the crock of the plating liquid, resting upon two strips of wood; obtain about one ounce and a half of pure silver and solder a piece of No. 16 insulated copper wire to it. Attach this to the carbon of the battery, let it dip into the center of the plating crock; also procure some finer copper wire, No. 22 gage; cut this into strips six inches long. Now take the forks and spoons; file down any badly worn parts, finish them off with some fine emery cloth glued to a flat strip of wood; and boil the lot in a saucepan with some strong washing soda and water to remove all grease. Scrub the fork or spoon with a fine-cut nail brush dipped into pumice powder; also wet the fingers and dip them into the pumice powder, so as to prevent any grease from coming into contact with the article. Scour the article well, twist one of the pieces of fine copper wire around the middle of the spoon, dip this into clean water, then quickly dip again into a solution of nitrate of mercury (one ounce of nitrate of mercury in one gallon of water). Rinse it again quickly in clean water, and place it at once into the plating liquid, suspending it from the ring of copper wire around the crock, which must be connected with the zinc of the battery. About a dozen spoons or forks can be treated in this way; the silver will take to the article at once. The sole use of the nitrate of mercury solution is to insure a perfectly clean surface, in fact chemically clean, which causes the silver to adhere firmly to the article. As soon as six or seven articles have been placed into the plating bath they must be removed and brushed well all over with a brass-wire scratch brush, known as a hand scratch brush, which can be bought, with two rows of brass wire, for 35 cents. The article when so brushed must be returned to the plating bath to receive a further deposit, which may last for an hour or more, according to the quantity of silver it is wished to put on. To determine the quantity deposited first weigh the silver plate, called the anode, when if at the end of one hour the loss has been 120 grains, it will be known that 120 grains has been deposited upon the twelve forks or spoons. The articles must be removed every half hour and be scratch brushed. This will rub down the white burn, as it is called, giving an even, smooth deposit.

When all the articles have been plated and scratch brushed wipe them clean, and burnish them by the use of a small steel burnisher, or, if this cannot be obtained, use a very smooth and bright shoemaker's awl. Hold the article with a clean cloth, dip the awl or burnisher into a little soap and water, stroke this carefully, with moderate pressure, up and down the spoon handle, and blend by continuing the stroking. Then rub carefully over the back of the bowl while the curved part of the awl can be used to rub the inside of the bowl. Of course a little care is necessary not to cut or abrade the deposited silver. Polish the article with a piece of chamois leather dipped into fine rouge, moistened slightly, and finish off with a clean chamois leather, It is important that the circuits through the several articles have the same resistance, otherwise more silver would be deposited on one than on the other. The diagram shows how this is accomplished when an oblong tank is used. The circuits through *A*, *B*, *C*, and *D* are all of the same length.

SCISSORS WITH A SAW-TOOTH.

BY W. J. C.

A very handy tool can be made from an old pair of scissors or shears, as shown in the accompanying sketch. One blade is cut with a set of saw teeth inclined toward the handle. These teeth hold the material fast, and prevent it slipping toward the point of the shears. Rubber sheeting, strips, and all kinds of soft packing can be easily cut with square or inclined ends. It matters not in what position the scissors are held; they will cut without slipping. In using



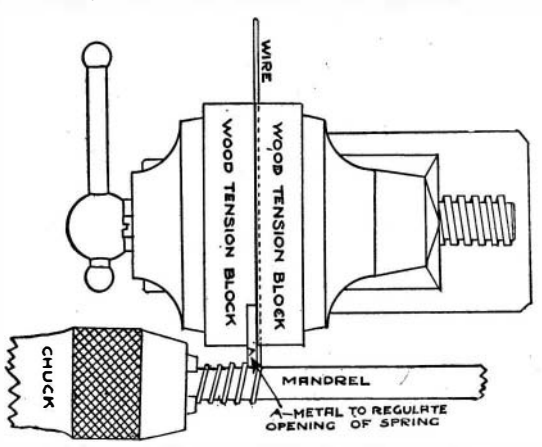
SCISSORS WITH A SAW-TOOTH BLADE.

these scissors for rubber and other slippery goods, the saw-toothed blade should be on the bottom to obtain the best results. Heavy rubber and packing can be cut with less effort, as it is not necessary to hold the scissors against the goods to prevent slipping. The same design of lower blade can be applied to plumbers' and metal-workers' shears with a change in the relative positions of the holding and cutting blades. If the saw-toothed blade is kept on the bottom of the goods, the edge will be left rough; but by reversing the shears, so that the saw teeth come on top, the edge is left just as clean as if no teeth were used. The piece cut off however is rough on the edge. The scissors can be used to cut paper, cloth, or any other material, if the saw teeth are kept on top or bottom, according as it is desired to have the smooth edge on the left or the right-hand piece cut off.

HOW TO WIND AN OPEN SPRING.

BY OTTO KERNER.

An easy way to wind a spring of the compression type will be found in the accompanying illustration. The mandrel on which the spring is wound is selected according to size of spring wanted. In this case the mandrel and the end of the wire were fastened in the chuck of a carpenter's brace. The piece *A* is a narrow strip of metal, the thickness of which regulates the spacing of the coils. If a closed tension spring is wanted, the piece *A* is left out entirely. The wooden tension blocks are clamped with the proper tension in a vise. If no vise can be procured, an ordinary clamp will answer the purpose.



METHOD OF WINDING AN OPEN SPRING.