Mainly about Construction

BY "MEGOHM"

A 112-VOLT B ACCUMULATOR

SIMPLE AND EASY TO CONSTRUCT

(CONCLUDED FROM LAST WEEK.)

The acid used should be pure sulphuric acid, as the small extra cost is worth while and ensures long life for the battery. Five of acid to twenty-one parts of distilled water is the correct proportion to use. Place the distilled water in a basin and pour the acid in gradually, stirring constantly with a glass rod. Fill the tubes by means of a hydrometer or a jug and small glass funnel, being careful not to spill. The acid should come about ¼in. above the wide part of plates. Each tube requires about ten drams of solution, and when the plates are not in this reaches a depth of about 3½ inches. Mix 63 fluid ounces of distilled water and 15 fluid ounces of acid, which may fill the tubes unless their diameter is above the usual average.

The panel of ¼in. ebonite measures 6½ by 3½ inches, and on it are placed the sockets for tapping off voltages from each row of cells. If the constructor desires other voltages in addition to those given, he can add the necessary sockets and tap the cells when required, but a strip of lead should always be soldered to the plate connector to stand upright, and the tap soldered to the top in the same way as done on the end plates. The sockets used will depend upon the pattern that can be purchased, but the style that sink flush with the panel makes the neatest job. Seven holes are drilled ¾in. apart for the top row of sockets, and 1¼in. from the top edge are spaced out the holes for 0 and 112 socket, and the flex leads and fuse connections. Three-eighths of an inch above the bottom edge are the centres of the terminals carrying the three voltages, and the negative and charging connections, and ½in. from the bottom of panel three holes are drilled to take ¼in. brass bolts, heads inside the panel, and a washer and nut outside for the ends of the fuses. Under these bolts and the terminals is a small plate of thin brass as a connector, and under the top end of which the fuse is clipped. Allow room at the sides for the thickness of the wood supports and screw-holes to fix panel. Each piece of flex is about six inches long, one end being connected to a pin to fit the sockets. The other end of the three voltage flexes goes behind the panel to the fuse bolt on its right The negative flex connects behind the panel to the negative terminal below it. The charging terminal at the right is merely connected to the 112 socket as a convenience in connecting up the charger. When charging up, all pins but the negative are plugged into the wood strip below the panel, and the charger is connected to the negative terminal, and the positive charging terminal at the other end of panel.

The fuses are made by pasting a piece of thin tinfoil upon a piece of writing paper, and then cutting this into fine shreds with sharp scissors. The best cuttings just over an inch long can be stuck with seccotine to a strip of strong paper, trimmed to size and the ends slipped under the washers and brass plate provided. These fuses may be considered a difficult thing to construct, but so long as there is a thin place in the length they will answer well, though very unevenly cut, and will absolutely protect any valve from damage by H.T. being "shorted" over the filament.

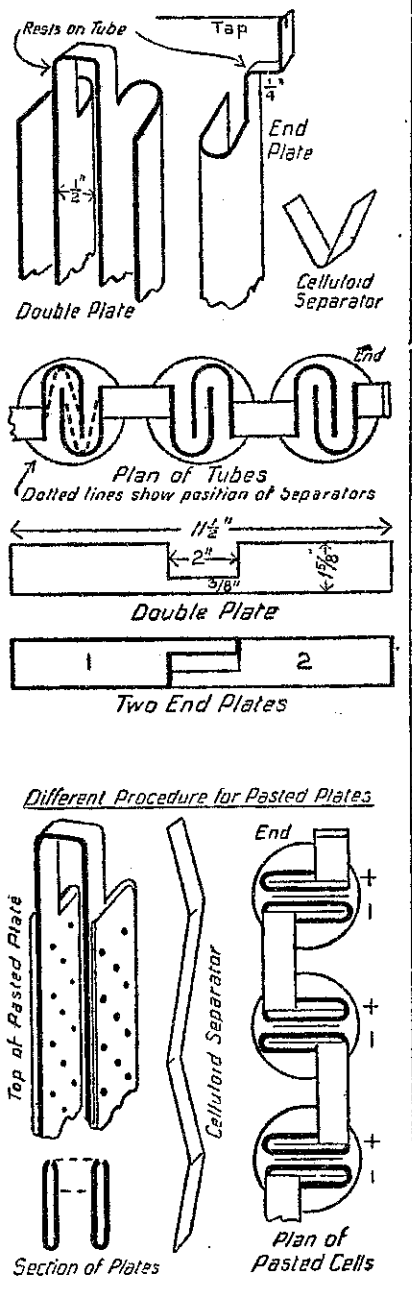
The acid should on no account be put into the tubes until the whole battery is completed and ready for the plate-forming. When all is ready, connect up the charger, only the negative flex being plugged into the panel. Turn on the current from the 230-volt mains with a good resistance, one lamp at least, in series with the recitifier. Forming currents should be gentle, and nothing will be gained in any way by forcing the pace. In a few minutes the positive plates will begin to show a brown colour if all is going well and the charging may proceed for an hour or so under supervision at frequent intervals. Then reverse the connections of the charger and leave for an equal time, so that the plates are reversed, those that should be negative now being brown. Then reverse again for double the time—now the positive plates will gain their proper colour, and in two hours reverse again, after which the charger may be connected the proper way and left for a few hours. The battery will not hold much current at first, but with continued charging each day, and not being allowed to stand very long, capacity will soon come, and will increase rapidly with alternate charging and use. The rule that applies to other accumulators applies to this also—never to let it stand very long in a discharged state. Before commencing to form the plates if a chemical rectifier is to be used, make sure that the aluminium in it is pure, a thin strip of good metal will be far more efficient than a thick rod of doubtful quality. There should only be a gentle glow round the aluminium, and if there is liberal sparking from it, rectification is not taking place, as thoroughly as should be desired. If there is any tendency for both negative and positive plates to turn whitish and a white deposit to be precipitated to the bottom of the tubes, charging should be stopped immediately and proper rectification obtained. However, if a reliable rectifier is being used, no trouble whatever is likely to be experienced. Use only enamelled wire, 22's or 20's for all wiring, and do not let the tap wires slope so that any moisture on them will run to soldered joints or down to the panel.

To charge this battery from 105-volt made or procured, mounted on a small ebonite panel and fixed in a convenient position on the outside of the case. The only actual alteration in the battery is to take out the wire connecting 56-volt tap to 58 minus, the latter then being connected to the middle contact of switch. A wire is led from 56 tap (b) to the right-hand arm of switch; the left-hand is connected to O socket, and the right-hand contact of switch is connected to 112 socket. Theleft-hand contact of switch is a blank. When the switch is pushed to the right over the two contacts, the two halves of the battery are placed in parallel for charging at 105-volts or thereabouts. When charging is completed the switch is pushed to the left, and so places the battery in full series for reception. With chemical rectifiers a lamp or suitable resistance must be included in the circuit, whatever the voltage of the mains.

If it is decided to put paste into the plates, holes must be punched through them from what is to be the inside, and any excessive burr can be taken off with a sharp chisel. A two-inch nail will make a suitable punch. Instead of the plates being folded into a U shape, they must be folded over a strip of 1-16th brass ⅝ wide and, say, 6in. long. Where the long edges meet they are to be turned towards each other on the edge of the brass by tapping, so that they meet fairly closely with the brass strip inside. The strip can now be withdrawn at the end, and the two edges of the plate separated far enough to allow of the paste being put in, sufficient for a thickness of about 1-16th of an inch. Now the two parts of the plate are pushed together again and the ends tapped down with a hammer to keep the paste in place, whilst the whole can be tapped down with a piece of wood laid on and struck with the hammer in order to consolidate the paste. There must be no wide gaps at the joins or the paste will gradually find its way out. The constructor would probably get the paste from old accumulator plates as the readiest source of supply, and each pair of plates must have one filled with the positive and one with the negative paste, and eight end plates of each. The celluloid separators, one for each cell, can be strips 6in. long and ½ or ⅝ wide, bent by warming, to give the acid free contact with the surface of the plates.

It would always be possible to convert the plain plates into pasted ones even after the battery had been in use for some time.

It is just as well to note that all dimensions given should be taken as



approximate only, and that they may be modified as found necessary. Unless the tubes are very full in size, the plates should be cut 1½ inches in width to give minimum trouble in fitting. The separators can be put into the plain plates before the latter are put into the tubes, each pair down one side of the row to have a separator near the top of each, and those on the other side to have a separator near the bottom of each.

The main point in making the frame is to make all divisions an equal square that will take the largest of the tubes without any jamming or forcing. An easy way to arrange this is to mark on the edge of a piece of paper the width that will take the tubes and the thickness of the laths used.. Then take a piece of lath and mark off these dimensions the required number of times, remembering that no lath thickness is required at the ends, as all four sides are put on separately, nailed with thin brads.

The cleaning of the lead is very important, whether pasting or not, and none of the cleaning material should be left on the surface.

If the battery is intended for heavy duty, pasting will be well worth the trouble, as it will give several times the capacity, and almost full capacity will be available at once, which is not the case with the plain plates. To make the paste, old accumulator plates are broken up, negative and positive kept separate; the hardened paste is then ground to a powder and made into a stiff paste by mixing with acid of the same strength as used in the battery. The old plates used must be free from "sulphate," which is a whitish deposit that shows on the surface. For pasted plates more holes may be made in the lead than are shown in the diagram, and so long as the diameter is well under one-eighth inch they might conveniently be made with a pair of punching pliers, afterwards hammering flat.

Cut a trial pair of plates and test them for fitting in the tubes before cutting of the whole lot. This may save a deal of extra work at a later stage.

When all the plates and separators are in place ready for the acid, test across each cell with a dry cell and 'phones or galvanometer, which will show if any plates are touching and require separation.

If lead weighing 3lb. to the square foot can be obtained, it will answer well, and in that case the total weight will be about 24lb.

THE CRYSTAL

SETTING LONG DISTANCE

With the advent of a powerful broadcast station such as 2YA, good crystal reception will be possible on both sides of Cook Strait, and for a considerable distance inland both north and south. Crystal listeners situated fifty miles or more from Wellington will be able to put in much interesting experiment in the way of increasing the volume of their reception; firstly, by the testing of different combinations of crystal and cat's whisker; and secondly, by the addition of an amplifier as is found necessary.

But the first item in getting distance with the crystal is to provide the very best aerial, for it is necessary to collect as much as possible of the infinitesimal voltage that comes through the ether. Forty feet is not too high, and a hundred feet or more will be a suitable length. Good insulators are essential, and great care must be taken to prevent the smallest leakage at the lead-in. The position chosen should be as far from trees as possible, as trees close to the aerial on the side from which the wireless waves arrive may easily reduce the strength of signals to one-half. However, the screening effect of trees can only be determined by actual trial at the particular spot, and if they are not too numerous, and are situated not less than fifty yards from the aerial, their effect will probably not be at all serious Whilst permanent detectors are good for short distances, they would, unless particularly sensitive, be superseded by the cat's whisker contact for long distance. The same rules apply to purchasing crystals as to the purchase of components—it pays to pay for a good one. Just recently the writer purchased a couple of permanent detectors to try out. One of them cost 3s. 3d. and the other 1s. 6d.; the former gives just double the volume of the latter. Galena is the crystal most recommended for long distance, and, instead of the usual contact with the end of a fine copper wire, a small pointed portion of graphite from a B grade leadpencil may be bound to the end of the cat's whisker with a fine wire and used to contact the face of the crystal. This combination is very sensitive, and its adjustment very critical, as only a very light contact is necessary. On this account a less sensitive combination may be preferred on account of its greater ease of operation, especially where valve amplification is employed. The efficiency of a whisker depends upon its freedom from any tendency to oxidise. In this respect it is said that there is nothing quite so good as platinum, which will be found to give surprising and consistently good results, says a writer in an English journal. It would only be necessary to bind a short fragment of platinum wire to the end of the cat's-whisker in order to experiment. Gold is also said to be a close runner-up to platinum.

Adjustment Essential.

Fine adjustment is an essential factor for long distance, and to obtain this it is recommended that the usual adjustment is provided on the cat's-whisker holder for finding a sensitive spot, the whisker itself being a delicate spring of about four effective inches of No. 36 copper wire. The crystal cup is mounted upon a strip of brass at a distance of about one inch from one end. At this extreme end, which is bent downwards to meet the panel, a hole is drilled and the end of the strip bolted to the panel, with the main portion of the strip slightly raised above the panel. At the end farthest from the crystal a hole is drilled and a screw or bolt passed through it and the panel in such a way that turning the screw will raise or lower the end of the brass strip. This provides a very fine rise and fall for the crystal, and after the usual adjustment has been made with the whisker, pressure can be regulated by turning the screw. Different varieties of crystals vary to an enormous extent as regards the actual pressure of contact which should be made with them by the cat's-whisker. For instance, a sensitive crystal of iron pyrites works most efficiently when it is used with a rigid steel contact (such as an ordinary sewing needle), applied with the pressure of its own weight. On the other hand, however, a silicon crystal requires only a very light pressure of a brass wire to produce its maximum volume of reception. With galena crystals, the finer the texture the finer will be the required pressure of the whisker.

A solenoid coil tuned by a variable condenser will give the smoothest control and sharper tuning than is usually obtained from a moveable two-coil arrangement.

Next Week's Features

NEXT WEEK THE CONSTRUCTION OF AN EFFICIENT AND EASILY BUILT CRYSTAL SET WILL BE DESCRIBED. THIS WILL BE FOUND PARTICULARLY USEFUL, AND IS THE RESULT OF SPECIAL EXPERIENCE WITH 2YA.

THE FOLLOWING WEEK THERE WILL BE GIVEN THE DETAILS OF A SMART-LOOKING AND SPECIALLY DESIGNED SET, WHICH WILL BE CALLED

"THE RECORD."

THIS WILL BE THE BASE OF FURTHER ARTICLES.

THESE ARTICLES WILL BE SPECIALLY VALUABLE TO BEGINNERS.

THAT HUMMING SOUND IN CRYSTAL-SET 'PHONES

HOW IT MAY BE CURED.

Some crystal listeners whose homes are connected to an electric supply may find that there is a slight continual hum in their headphones. This interference is caused by nearness to the electric wiring in the house or by the influence of street mains upon the aerial, which may be running more or less parallel to the street wires. Here is a simple method that may eradicate the trouble. Place a slightly-moistened finger on the earth terminal of the set, and if this cuts out the hum, then a permanent equivalent to the finger can be tried. This consists of a length of a few feet of bare copper wire attached to the earth terminal of the set and allowed to run loose along the floor. It may improve matters to connect the free end to a metal object, perhaps a foot-square sheet of metal placed under the floor covering, but neither this nor the wire is to be directly connected to earth.

WIRE FOR AERIALS.

Which is the best kind of wire for a broadcast receiving aerial? Opinions vary a little on this point. An American authority says: "While the actual size would depend upon the span, No. 14 B & S hard-drawn copper wire will answer for any spans up to 125ft. Above this, it would be safer to use No. 12 wire. Phosphor bronze wire is used for long spans but the cost is considerably higher. The solid wire, despite theory, will not give an appreciably higher resistance (which is undesirable) than stranded wire. From tests on loop aerials, it has been found that the heavier the wire the better the results obtained. Care should be taken that all the wires should be as well insulated as possible, both from the frame of the loop and other objects."