Mainly about Construction

BY "MEGOHM"

CHARGING THE 112-VOLT B ACCUMULATOR

HOW IT CAN BE DONE AT 20 VOLTS BY MEANS OF SMALL ADAPTER

(Continued from Last Issue.)

This device, the description of which was commenced in last week's "Record," is an attachment to the 112-volt B accumulator described in Nos. 2 and 3 of the "Record." By means of this idea a high-tension battery may be charged at low voltage by a full-wave valve rectifier intended for A battery charging, and giving about 20 volts. For the convenience of readers who have not seen the battery article, this description will be made as complete as possible, so that it could be constructed for attachment to any existing B battery.

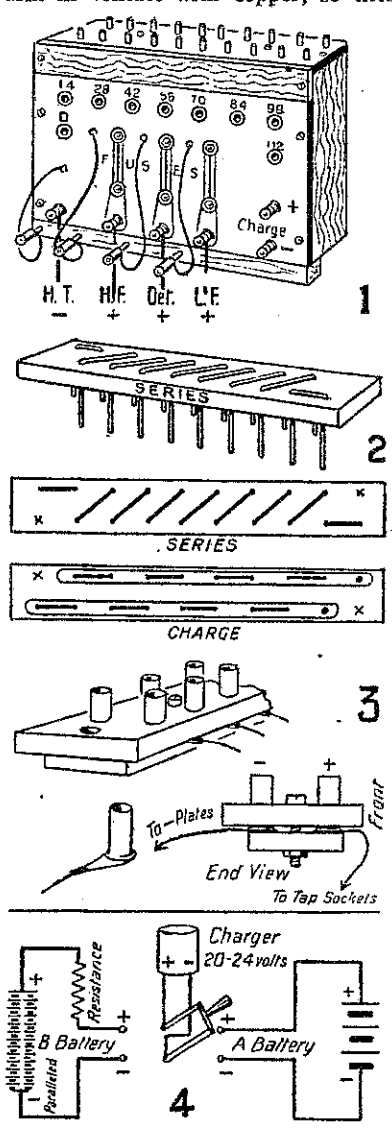
THE DISTRIBUTION PANEL.

Figure 1 shows the ebonite distribution panel 6½ by 3½ inches, which is already a part of the B accumulator. The extra attachment is the strip of ebonite at the top, through which are inserted small copper mercury cups, into which suitable connectors are placed, so that the rows of cells in the battery are connected in "series" for discharging, and in "parallel" for charging. It might here be mentioned that the use of mercury about a radio set is not to be recommended in a general way, but, used in the way here indicated, no trouble can possibly be caused, and the contact obtained is more certain and reliable than can be obtained by other means. The idea could certainly be carried out with sockets and split pins for contacts, but the accurate drilling required to do this would prove a stumbling-block to most amateurs.

A panel arranged as shown is a convenient attachment for any B battery when experimental work is carried out, and varying voltages are required, as the plug-in system is so much more convenient than loose clips. Any number of additional voltages can be provided by inserting extra sockets connected to a wire tapping the row of tubes or cells at the required point. It will be noticed that four flexible leads come through holes in the panel, and to the end of each of these a split plug is attached, which may be fitted with a short piece of 3-8-inch bonite rod as a handle. The left-and flex is the negative connection, and forms a handy means of cutting off the H.T. at any time without taking out the positive plugs, which, however, must always be taken out when the battery being charged. When not in use, the plugs are inserted into holes drilled in the strip of wood below panel, as shown. The fuse provided on each voltage to protect valve filaments is a wise precaution. The fuses are made by pasting a strip of cigarette tinfoil upon a piece of writing paper, and then cutting this into the finest shreds with sharp scissors. The best cuttings about an inch or three-quarters long can be stuck with seccotine to a strip of strong paper, trimmed to size, and the ends slipped under the washers provided, held down by ½in. brass bolts through the panel, with the nuts outside, handy for replacement of fuses. The lower end of the fuses is connected to the corresponding terminal by a strip of thin brass. All connections are shown in the wiring diagram published last week.

THE MERCURY CUPS

We now come to the portion that is the actual addition to the battery as already specified. A full-size templet of the cup panel is given, so that the ebonite can be marked out accurately by placing the paper over it and punching each centre The two holes marked A are ¼in. diameter, for the purpose of taking the brass bolts that hold a strip of ebonite 5½ by ⅞ inches, placed underneath to hold the cups in position. This strip is drilled with two holes in corresponding position. The hole at either end marked B is to take a screw to hold the ebonite down to the wooden side supports. The most suitable article to serve for mercury cups is empty .22 rifle cartridge cases. Mercury can do no harm in contact with copper, so these



serve the purpose admirably and should be easily obtained. Twenty will be required, all being selected for being of correct shape and unbent. These cases are now cleaned by placing them to soak in battery strength acid for an hour or so, then washed and rinsed well in water. Now, with a knife round the end of a piece of stick to fit into the cups, placing a pinch of pumice powder in each and working the stick round to clean the inside. The outside must also be brightened by rubbing with pumice and water on a rag. Small tags of copper foil about ¼in. long are now cut the width of bottom of cups at one end, tapering to almost point at the other. A cup is now soldered to the broad end of each tag, and a 22's enamel wire to the other end. Eight of these wires must be long enough to reach the front negative plate of each row of tubes, and the other wires long enough to connect to back of panel. The cartridge cases measure about five-eighths inch long and just under a quarter-inch wide, and it will be found that a fifteen sixty-fourths twist drill makes a hole that is a splendid fit. It is not an easy matter to drill a row of holes so that they all line up exactly, unless special precautions are taken, and the best way to ensure accuracy is to use the drill to make a hole through a 3-16 piece of brass. Clamp this in turn over the place where a hole is required, and drilling through the hole in the brass, the drill is bound to pierce the ebonite in the proper place. When these and the four extra holes have been drilled, assembling may be done by placing the cups in the ebonite held downwards, placing the holding strip on top and bolting it in place.

If your battery is already built, the panel need only be unscrewed and the top tilted forward slightly. The cup panel can then be held on edge, cups facing outwards, and the leads from positive cups connected to the back of tapping sockets, and other connections made according to diagram. The hole for extra charging terminal should be drilled before panel is unscrewed. Now the cup panel can be folded back, and the negative wires passed through slot to tubes. The positive wires to sockets must be sufficiently long to allow of front panel being lowered an inch. This inch space allows of the connecting wires inside being regulated not to touch each other after both panels are fastened in place, then the space is closed by a strip of wood, as shown. Enamelled wire is the best to use, as the spray from an accumulator soon rots cotton covering. In adjusting connecting wires they should be arranged to "fall" away from the panel so that the moisture may not run down and corrode brass nuts. A slight U bend made in any wires prening from battery to panel will prevent any drops of moisture from running down to the latter.

THE CONNECTORS.

Figure 2 shows the "series" connector or "comb" as they may conveniently be called. Two of these will be required, one for charging, the other for discharging. The combs consist of a piece of close-grained wood 3-8-inch thick, 5 5-8 long, and 1 1-8-inch wide. These are finished off with glass-paper and given a coat of shellac varnish, and are then marked for position of holes with the paper templet, two rows of ten holes each, just as ou the cup panel, but the holes must be drilled to take the 14's copper wire which is used in making the connecting staples. The diagrams below give the connections on the combs. There is a projecting wire below each hole, except those marked X. The staples are bent with a pair of square-nosed pliers, and must project about ¾-inch below wood. The best way is to make them too long, afterwards trimming equal. In the series comb most of the staples run diagonally, as shown, with the exception of one at each end. In the parallel or charging comb, all negative cups down one side, and all positive on the other side, are to be connected together, and this may be done in any way that seems most convenient. The method shown is to screw a strip of thin brass along each side, then drill this from underneath, the holes in wood guiding drill. Black lines show tops of staples, but there is also an odd projection at one end of each brass strip. The staples are now pushed through, and the tops so ed to the brass strip The two holes being missed at the ends, cuts out all connection to the set when charging is being done, thus absolutely preventing current accidentally reaching the set from this source.

GENERAL REMARKS.

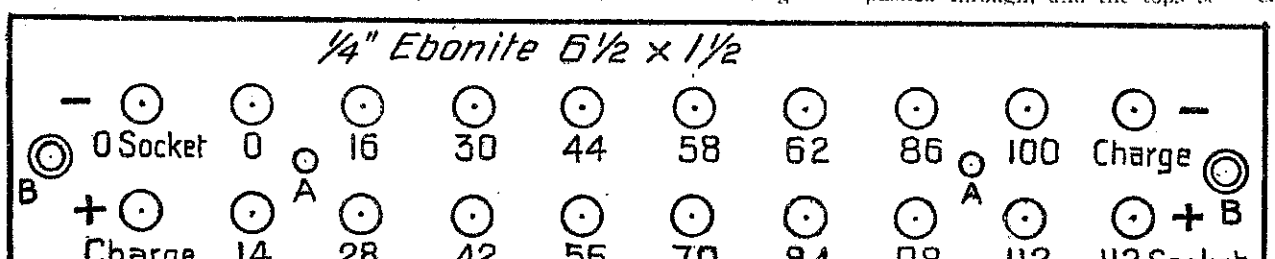
The charger leads may remain permanently connected to the charging terminals, and a double-pole, double-throw switch can be provided as shown in diagram, to charge either A or B battery as required, being held in neutral position when not required. In case of the charger being accidentally switched over to the B battery with the series comb in position, nothing would happen, as this comb cuts off all connection to the charging circuit. When the battery is not in use the series comb can be taken out, so that the highest voltage is then only that of one row, 14 volts, which reduces any chance of leakage.

As there are seven cells in each row, the total voltage of these will be 14 volts, so that a charger giving about 20 volts will answer well, current being regulated by a short piece of resistance wire, if required. Half amp. or a little more, will be a good charging current, and charging should be complete in about an hour and a half.

The cups are not to be more than half filled with mercury, and the less the better, provided that it is not much more than one-eighth inch deep. The wire connector takes up space, and if the cups are too full the mercury will spill over when they are put in. The best way to fill the cups is to take a cartridge case as used for the cups, cut it down to the depth the mercury is to be, twist a bit of 20's wire round for a handle, and use as a ladle to get just the right amount and place in each cup. A shilling's worth of mercury is more than sufficient for the lot.

To adapt this idea to other batteries, say of 24-volt units, the connector in the centre of each unit is cut, giving 12-volt units. The positive and negative end of each 12-volt group is then connected to its proper cup, which will be numbered according to the voltage, 12, 24, 36, etc., and a charger giving more than 12 volts, say 16 or more, may then be used

In case it is desired to vary the method of construction in any way, it should be mentioned that the only metal that can safely be used in permanent contact with mercury is copper. It eats away brass or zinc, and solder it dissolves in a very short time, so that it cannot be safely used for many purposes for which it would otherwise be well suited where absolute contact is essential.



Next Week's Feature

A STURDY FULL-WAVE B ELIMINATOR.

Next week "Megohm" will commence a description of a thoroughly reliable and efficient full-wave B eliminator, capable of running a five or six-valve set. This eliminator works from 230-volt A.C. mains without the slightest trace of hum, and is equally reliable on the most distant DX reception as on the local station. It has even been found better than a battery on DX, as the liberal smoothing arrangements tone down static considerably, rendering it less objectionable. Where current is paid for at the rate of 6d. per unit, the cost of running this eliminator is 25 hours for 6d., or one-farthing per hour. Construction of the transformer will be fully dealt with, illustrated with all necessary working drawings, and the construction of other parts will be similarly dealt with in as full a manner as possible.

CELLULOID ACCUMULATOR CASES

REPAIRING LEAKS.

Sometimes a celluloid accumulator case will develop a leak, and unless this is repaired in a suitable manner will continue to give trouble, despite the best efforts. If the leak is not very large there is no reason why it should not be repaired by any handy person.

Buy a few pennyworth of acetone from the chemist and dissolve a few pieces of celluloid—perfectly clean pieces they must be—in it. The celluloid should be added until the solution becomes rather thick in consistency. Keep the acetone corked up while the dissolving is being carried out, as it is extremely volatile and would soon evaporate if allowed to remain in the open.

It is best now to empty the accumulator—it need not be rinsed out or dried—and then apply the solution, which should be practically thin paste by now, to the leaky portion of the accumulator. Allow to dry and then apply more. Do this three or four times, when it will be seen that a considerable layer of celluloid has covered and filled up the leak It is necessary, of course, to have the portion of the battery round the leak free from dirt.

As soon as the celluloid paste applied to the leaky portion has dried—it will do so very quickly—the acid can be poured back into the battery and the cells are ready for work once more.

It is important that the celluloid dissolved in the acetone should be free from dirt. Pieces of old photographic film will be quite suitable if the gelatine is removed by soaking in hot water previously.

TRY TWO LOUDSPEAKERS

CLEARER ORCHESTRA RECEPTION

Have you ever heard your wireless set as reproduced by two loudspeakers?

With only one source of sound you are apt to call a violin solo "splendid" and a full orchestra "fuzzy." One reason is that the ear is accustomed to hear a voice or a solo instrument coming from one definite spot, and the single loudspeaker gives you this condition. On the other hand, the music of a band or orchestra heard in the concert hall comes from an area of many square yards and not from a single focus.

In such a case the single loudspeaker cannot help giving a false impression in this respect.

Try the experiment of connecting two loudspeakers to your set, placing them some distance apart. The illusion of an orchestra is greatly improved, because you have more than one source of sound and obtain something of a stereoscopic effect. For a casual see-how-it-works experiment the loudspeakers should be connected in "parallel."

You do not double your volume, but you should find a marked improvement in quality. The best effects come when one instrument has a greatly differing tone to the other. One will look after the rich deep effects, while the other will give you brilliance A horn model in tandem with a hornless type should give you this combination.

The best balance reproduction comes with two loudspeakers of similar resistance, else one may be greedy and overpower the other.

The two loudspeakers, one high and one low in tone, may be used separately to get the best results from solo broadcast items The low-toned instrument will enrich a violin or piccolo, while the shriller loudspeaker will add brilliancy to a heavy bass voice.

This method has been extensively used for some time in both Britain and America, and it undoubtedly gives the best reproduction obtainable under present circumstances, neither the horn nor the cone speaker being as good by itself.

"Megohm" has been testing out the idea for about three weeks with an "Ellipticon" double-action cone speaker and a medium-sized horn speaker, and finds it to be all that is claimed for it.

One advantage is that neither speaker is overloaded, and yet both are giving maximum undistorted volume. The melody, emphasised by the horn, stands out against the deep sonorous bass notes given by the cone, but almost or entirely lost in the horn. The consequence is a surprising clarity, otherwise unknown in band and orchestral items.

The best arrangement is to have the two speakers on the table about a yard apart, backs to the wall, both facing the same way.

LOOK TO YOUR AERIAL

IS THE LEAD-IN JOINED ON CORRECTLY?

Glancing skywards, one cannot help noticing the different ways in which aerials are erected, and the lead-in wires arranged. Some otherwise very good inverted L aerials are spoilt by the lead-in being attached to the aerial wire at a distance of anything up to five or ten feet from the actual end where it should be placed.

Then there is the aerial that pretends to be a T, but isn't. An efficient T aerial should have arms of equal length, that is, the lead-in must be joined on at the exact halfway point. Yet it is a common thing to see such an aerial erected and the lead-in joined on many feet from the centre, and one naturally wonders just how much trouble this misplacing of the lead-in is causing.

How does the oscillatory flow of current take place in the case of the T type aerial when induced by the incoming ether waves? It will commence its flow from the two extreme ends of the two "arms" simultaneously, will combine at the point where the down lead is connected, will rush to earth through the set, back through the set up the down lead (or should we say in this case up the up-lead?), divide at the point of connection, flow to the extreme ends of the two arms, and will return and repeat the cycle until "worn out," or will continue its "swing" if the circuit is tuned so that it arrives back at its starting point just in time to be pushed off by the next incoming wave—in other words, if the circuit is tuned in. Now what happens when the two "arms" are not of equal length is simply this, and that is that in the first place the current starting from the extreme end of the shorter arm will get to the down lead first and will precede the current from the other arm, will complete its journey to earth first, naturally, and will have turned to come back only to find that the other is opposing it as it has not yet finished its journey to earth. So instead of combining together at the down lead each time and again at their point of return, thus forming, as it were, one combined current, it will tend to be divided into two separate currents which will oppose each other at various points, with the result that reception will be, to say the least, inefficient. This condition must obtain, therefore unless the down-lead is in the absolute centre or at one extreme end of the aerial.