The Pros and Cons of Electrolytic Chargers

I FIRST started by constructing the trickle charger described by "Pentode" in the "Record," writes W.A.R. (Martinborough), exactly to specifications. I used pure ammonium phosphate, and a great time I had procuring a half-pound of it, too; also a rod of pure aluminium 3-8in. thick, but just sufficient current came across to put a small speck of red in a torch bulb, nor could I get anything better.

Not liking to be beaten I delved about with jars and things, using whatever aluminium I could get hold of, and tried out somebody's suggestion, using borax for a solution. I had reason to believe that I was doing all right by using large saturated solutions of borax and large surfaces of lead and aluminium, when I made the discovery that the lead was not essential, that iron or tin did just as well. By this time I was contriving quite ingenious electrodes and finally constructed an efficient apparatus.

I thought, if tin will do in place of lead, why not put the solution in a tin, a much larger surface will then be presented to the solution. Working on this idea, I cut down a two-gallon cylindrical tin that had contained oil, placed a thick piece of "Rubberoid" in the bottom, poured the solution in, and then used the household aluminium pots.

To keep the pot down I filled it with water, which also acts as a cooler, though I have already found that the larger the electrodes, particularly the aluminium, the heavier the currents may be handled without heating. I then put about 150 watts in the circuit for about ten minutes until the bubbles appeared on the surface of the pot. Then I hooked up a 3 amp. wet cell that I had run out dead flat, and with the lamp's 150 watts still in the circuit held the charger connections to the posts of the battery for five seconds. I then applied the torch bulb to tthe battery or cell and it lit up bright for 5 seconds, dim for five seconds, then slowly died out. I repeated this several times for longer periods with the lamps in the circuit and using the secondary 12 volts from the transformer, and proved without a doubt that the charger was working.

Being curious to see what current the rectifier would rectify without heating, I put the iron in the circuit. The iron passes somewhat in the region of 3 amps, and although I had to switch off every now and again on account of the iron becoming hot, the solution only became lukewarm, which I soon remedied by putting the rectifier in a half bucket of water. Of course one would not want to rectify 230 volts at 3 amps, but the point is that from dead flat I could put electricity into the cell with the iron in the circuit.

I then tested the efficiency of the apparatus with a voltmeter two-way, across the secondary of the transformer, 12½ volts, across the jar 12 volts. This seemed good to me, 12 volts rectified sounds all right. The trouble is the transformer does not deliver 12 volts at a ½ amp. I know this, because I hooked a ½ amp. valve across the secondary of the transformer, and it did not light up any brighter than it does off a 6 V.A. battery. I borrowed another transformer from another radio experimenter, who also failed to get the trickle charger going, and hooked it up in parallel. Result, 12 volts, valve lit up considerably brighter. I am inclined to think that these transformers singly deliver 12 volts at about 1-10 amps. This would light the valve up about the same as the 6 volt A battery would. Is this not so? Amp. meters refused to work, of course, on the A.C. side, and, strange to say, milliamp. meters refused to work on the rectified side.

Several failures round here to get any current from the rectifier probably rise from the fact of the low amperage the transformers deliver. I know that it took 24 hours to charge the 2-volt cell 3 amp. cap. And in connection with this I may state that I constantly tested the voltages throughout. Disconnecting from the cell, of course, which shows 2 volts when charging, also the ½ amp. valve appeared to light up just as bright across the rectifier, as it did across the transformer.

Before leaving this subject, I would like to pass on a tip in connection with testing. Before the electrodes are formed, if a pair of phones are placed with the positive phone tip on the aluminium, and the negative tip to the negative of the charger, the "A.C." hum will roar in your ear. When the electrodes are formed the hum disappears altogether.

When creeping of the solution takes place, or the aluminium becomes pitted or covered with a sludge, the "A.C." hum comes back.

Another test: Switch off and apply phone tips one to each electrode; note condenser discharge.

The great drawbacks are: Borax creeps and quickly forms a deposit on the electrode. The fact that you have to use a saturated solution makes the creeping trouble a nuisance. If paraffin oil is floated on the top, the borax crystallises at the sides and bottom. Also, I have been using old pots, kettles, etc., which are not pure aluminium, and corrode in about 48 hours.

To obtain ammonium phosphate and pure aluminium here in Marlborough is almost impossible. I had a service car driver hunting all Wellington for ammonium phosphate, and he eventually procured half a pound, all there was in the shop, and I don't think it was any good either. I would like to know:—

(1) Where can I obtain "pure ammonium phosphate" and pure aluminium sheet, and any idea of the price? Also, where can I obtain a transformer about 12v. and ½ or ¾ amps? (Sharland's, Dixon Street, Kempthorne Prosser, Victoria Street, Wellington, can supply pure ammonia phosphate. Pure aluminium from John's, Ltd., Auckland, and Ballinger's, Wellington. General Electric Co., Wellington, should supply the transformers, but 20 volts output would be most suitable.

(2) Do you think it practical to put a low voltage lamp or lamps in series and send the 230v. with about 100 milliamps across the jar, and after rectification pass through an electrolyte condenser? Then arrange a series of resistances to tap of say 22, 70, 90, 180 volts? In fact to construct a B eliminator? Or, secondly, would it be possible to drive the last stage of my push-pull amplifier with this arrangement? I think that owing to the condenser characteristics of this type of rectifier the 100 milliamps will be easy to filter.—Electrolytic condensers only operate on low voltages. The method is unreliable.

(3) With pure aluminium and pure ammonia phosphate how long will the aluminium and ammonia phosphate last? Tin seems to be unaffected by borax, and I believe it will resist pure ammonia phosphate indefinitely.

THE following suggestions may be useful to the correspondent, who has gone to some length to describe modifications worked out by him. It appears that the resistance is rather too great for 12 volts to break down, so that it will be necessary to use a transformer with an output of at least 20 volts. Such a transformer tapped at, say, 10, 20, or 30 volts would be the most suitable, for then different tappings could be tried.

Electrolytic rectifiers for B supply are quite unreliable unless 4 to 8 jars are used. Pure aluminium ought to last from six months to two years, but the pure metal is difficult to obtain. Cheap, impure metal was found to work quite well in the model made up and described by "Pentode." At the present time, it appears that about 300