Going-going-gone

Historians have recorded libraries full of minute detail of the goings-on of kings, queens, generals, clerics, politicians, etc. but often know little of how the ordinary person managed to survive.

This seems to be the case in documenting items that were by their very nature disposable but absolutely essential to making various things more or less important to society functional.

High voltage (H.T.) radio batteries of the 1920s are very rare in today’s collections. Most were not rechargeable and could not be rebuilt, therefore they were thrown away.

My research indicates there is insufficient information to reconstruct museum grade replicas of high voltage radio batteries made before about 1934 in the U.K. and the rest of Europe. We are a little better off in the USA with fairly good information going back to 1925/27. There are some black and white advertisements and even a few black and white photographs; however there is no color information, accurate dimensions or views from all angles for these batteries.

If you have any such batteries in your collection; regardless of condition, please photograph or scan as soon as possible. Please share the photos or scans and basic dimensions. If you have access to a flat bed scanner, scan all faces of the battery. Such scans will insure the most accurate reconstruction of artwork possible.

I have built a web page that gives you step-by-step instructions. Here is the URL.  
http://kd4hsh.homestead.com/Battery-Art-00.html

Exhibition or display of vintage wireless equipment is so much more meaningful when all the elements for actual operation can be seen. When vintage “support equipment” such as disposable batteries are not available, it is appropriate to use accurate replicas if so identified.

For your information. – Some examples of low voltage grid bias batteries made in the U.K. or other parts of Europe do exist. However there are many battery versions that have yet to be photographed or measured. Also in the USA, there are known examples of Eveready and Burgess H.T. batteries from before 1930.

Please let me know if you have anything to contribute.

Two examples of exhibits showing all the required support equipment for operating a radio. One from the 1920s and about ten years later.

Fabrication of radio batteries in the 1920s.

The overwhelming majority of dry cell batteries made in the 1920s used a center carbon (graphite) electrode, an ion transfer and depolarizer paste of ammonium chloride & zinc chloride and a sacrificial Zinc metal can.
The cell is capped off by pouring-in hot pitch; a slightly refined very heavy fraction of petroleum or coal tar. (a.k.a. - asphalt or bitumen.) The reason for using this material is that although it appears hard, it never becomes a solid and therefore maintains a good seal between the carbon electrode and zinc can.

As a side note demonstrating this characteristic, there is a famous on-going experiment at the University of Queensland initiated in 1927 by Professor Thomas Parnell. A glass funnel was filled with pitch and, since 1927; 9 drops have passed thru the funnel…. The most recent in April, 2014.

On top of the pitch, the battery was topped-off with ‘red pitch’; something that is not real pitch at all. It is a mixture of coniferous tree resin, tallow and old brick dust. This material was used because at room temperature it is rigid enough to support battery terminal posts or Fahnestock clips and can be embossed with polarity markings and logos (when it cools to about 115° F). For me, it proved very difficult to locate. Apparently the only modern use of the material is in the artisan metal working trades where it is used to back sheet metal for the ancient hammering technique known as chasing.

I have yet to find period documentation on the various material formulations, no doubt these were considered to be proprietary information.

This potting method appears to have been dominant up until the mid 1930s. At this point, Eveready began to install multi-pin female receptacles in their radio batteries. (Not to be confused with the European practice of the 1920s in distributing individual female sockets across the top surface of the battery.) At some point in the late ‘30s there must have been an R.M.A. standard adopted for the multi-pin receptacle but I have yet to find specific references.

**Fabricating Jigs**

A close examination of popular vintage batteries will reveal that the outer paperboard case is most often unbleached chipboard in the range of 0.03” to 0.08” thick with a thin multi-color letterpress sheet glued to one side. The thin sheet overlaps the top edge of the card stock and is wrapped around to cover the edge. The discount battery makers would often eliminate this step and use chipboard with a laminated paper sheet ready for the letterpress, the graphic then printed directly upon it, leaving a raw cut edge showing. Another
way to reduce cost was to not employ a graphic that covered all sides of the case. Here you will see a plain black box with a single multi-color letterpress printed label pasted to one side. This also made it easier to apply private label branding for distributors. The graphics of the largest manufacturers will have patent declarations, registered trade marks and addresses of the manufacturer.

Although I have not seen any vintage photographs of dry battery manufacture, it is obvious to me that speedy production of card stock battery cases required steel rule die cut sheets. In addition to die cut sheets, embossing dies were used to force bending grooves into the stock. Examples of thicker card stock actually have 90° V-grooves cut from the stock to facilitate corner bends. No doubt fabricating jigs were used to hold things in place until glue set. So if I were to make more than a couple replicas, it is necessary to make rudimentary jigs also.

As with any manufacturing process, tight control of material dimensions prevent cumulative errors during assembly.

Making Eveready #763 and Burgess #4156 – Miniature ‘B’ Batteries.

These batteries were first developed to be used in WW-I vintage airplane transmitter and receiving equipment where light weight was a paramount consideration. A Signal Corps specification for a type BA-2 battery gives size, weight (1 lb.), voltage, wire leads and a requirement for it to be ‘waterproof’. Both Eveready and Burgess made batteries claimed compliant to that standard.

When the Radio Corporation and General Electric decided to develop a two tube portable battery radio in late 1921, this was essentially the only small battery that would fit into a compact cabinet along with two 4.5 Volt flashlight batteries to power the UV-199 tube filaments. The next step up in common batteries would have been to two “two pound” ‘B’ batteries and a quantity of three 1.5 Volt #6 dry cells for a total volume increase close to 400%.

Since I am not going to fill my cases with potted, and therefore non-replaceable, batteries; just the carton will not be rigid enough. The obvious solution is to fabricate a wood box to provide backing. For this I use a combination of kiln dried poplar board and 1/8” thick Baltic Birch plywood. I have a 12” Craftsman band saw fitted with a 14 t.p.i. blade. Believe it or not, it is possible to set it up and lock down the rip fence and cross slide so that you can easily cut your wood to tolerances better than +/- 0.005” and square to within a small fraction of a degree.

These near perfect bits of wood are no good if they are not assembled properly, for that I need an assembly jig. This jig is made of 3/4” thick MDF shelving. (See Fig. 1) It is machined to be absolutely square. The way to do this is to glue two parallel rails to a base board that are just a little bit closer together than the width of your box. Then using a table saw, router or milling machine; trim the inside edges to the exact width of your wood. This insures a perfectly square and parallel wall for your two rails. You rotate your baseboard 90° to make a pass along one end of the two rails to produce another square surface.

In these little boxes, the only measurement to be concerned with are the outside dimensions. That allows you to use a spring loaded scissors clamp to push your end boards up perfectly square to your machined rails. Two vertical bars are installed that are slightly taller than the assembled box. This gives you a stop surface for positioning your boards.

The end boards are clamped in the jig, the panel joints are then coated with fast set waterproof wood glue like Titebond Premium wood glue. The side panel is placed on top of the end boards and moved up against the vertical stops and pinned using a 23 Gauge headless pin nailer.
Using a pin or brad nailer is far superior to hammering in brads. There is much less chance for the joint alignment to shift as when pounding in brads. (And of course, it is much, much faster.) There is another advantage of using tiny headless pin-nails. The only reason you are using these nails in the first place is to hold everything in place until the glue dries. Should you find that you missed your joint alignment by 10 or 20 thousandths, you can move your box over to a smooth jaw bench vise and clamp the joint flush… The 23 gauge pins will bend enough to comply if the glue has not set.

After wiping off any excess glue, the assembled parts can be flipped over to attach the other side panel. On such small parts, I find it most convenient to pour the glue into a bellows type glue injector with stainless steel needle.

In the case of an assembly with a top panel, the same jig serves as a way to keep the side panels absolutely square when gluing and nailing the top. Therefore assembly goes quickly.

In the case of the name brand batteries like Eveready and Burgess, they have cases with wrapped top edges. I have found that just laminating the graphic to the chip board, then wrapping the edge before bending the glued up paper laminate around the wood box does not work well. The fused laser pigments may crack, and the thin paper may even tear. It works much better to wrap and glue the chipboard (actually high quality extra thick, 0.025”, poster board in my replicas) to the box and then wrap the graphic afterwards.

To get the chipboard to adhere perfectly to the wood box, a glue fixture is called for. (See Fig. 2) The heavy card stock, when wrapped around corners of the wood box; has too much spring in it to stay flat to the sides. One apparent solution would be to spray the card stock with contact cement for the ‘quick grab’. However, this does make the wrapping more difficult (you have only one chance to get it perfect) and the contact cement will soften later when the red pitch is being poured into the top of the battery.

This glue press applies proper, even pressure to all sides as the slightly diluted wood glue takes its time to dry. I made two of the jigs so I could keep performing the same task.

The premium poster board card stock you use in place of the chipboard has a glossy side and a natural, dull side. The dull side is glued to the wood box. The reason for that has to do with the thin graphic sheet that you will glue to your card stock. In making these replicas, I cannot justify the expense of having color graphics being printed via letterpress or offset printing. With that custom printing process I would have a wide choice of papers to choose from. I have found ink jet printing on home office printers does not produce an image that has the right luster and crispness to mimic the original printing techniques. The other problem with home office ink jet printing is that these images use a LOT of VERY expensive ink to get the saturated colors required.

To date, I’ve found that Xerox color laser prints made on standard weight (20 lb.) paper, not photo grade papers, at your local Staples print shop come closer to the originals when ‘doctored’ as discussed later in this article. And the prints are cheap. This thin paper will tend to pucker if too much glue is applied. The glossy side of the card stock will hold a thinner film of glue and prevents such problems.

One problem I have identified is that laser prints like this will not accept glue over the fused pigments. This can present a problem where you may be lapping a printed seam. Currently I am carefully sanding any printed surface to get down to the paper surface that will accept the glue. I may experiment to see if there is another remedy.
Next you take the graphic and cut to size and place on the box that is now coated with a thin film of wood glue. Since the paper is thin, it easily conforms. The paper is trimmed to wrap over the top edges of the card stock but is cut long enough so that the edge of the paper actually extends down over the inside of the card stock and over onto the wooden top as well. The reason for doing this is that there will invariably be splinters along the cut edges of the plywood that will result in small pockets along the glue line between the card stock and the wood top. These pockets will trap air during the pour of the potting compound, expand and may rise to the top causing bubbles at the surface. Having the paper glued down to the wood will reduce these problems. You could also just use your needle glue bottle to lay down a ‘caulk’ of glue along the joint. But right now the first method definitely takes the least time once you try it a few times.

The box is turned over and the paper slit so that it can be glued and wrapped around the bottom opening provided for installation of two or three 9 Volt batteries. A metal F-F 6x32 x 2” spacer is mounted in the center of the top to retain a bottom, U-shaped cover in place.

Now is the time to ‘doctor’ your laser graphic. As you can well imagine, these graphics look brand new. Whites are brilliant and colors are pure. These battery replicas are intended to be seen in a setting with vintage equipment. You really don’t want to attract the attention of the viewer to an issue of old versus new. In the production of the graphic, photo editing tools allow you to tweak variables to help mask the ‘new’.

In the original print process, the distribution of ink on the plates was not nearly as homogeneous as can be applied today. One of the most powerful tools of photo editors is to insert ‘noise’ into the image or to clone, less-than-perfect areas of the original image to over-write pure color fields. So it is always desirable to pay attention to doing this during production of the graphic.

However tweaking of the colors to mimic the aging of the artifact is much less effective when done with the photo editing tools. Fortunately it is still easy to attain the desired result by applying an over-spray of the finished box. The added bonus of this over-spray is that it provides protection of the laser graphic.

The spray consists of non-water based lacquer such as semi-gloss automotive clear coat with the addition of a few drops of compatible wood dye in ‘golden yellow’ or ‘light oak’. A minute spent with a small air brush will give you that authentic look of ‘kind aging’. Fortunately the laser pigments and wood dyes are stable over time and the low sulfur content of modern paper minimizes any additional yellowing.

In the case of the Eveready #763 and Burgess #4156, there are 20 AWG fabric covered stranded wire leads with a crimped ferrule on the end rather than threaded male studs or Fahnestock clips. Finding appropriate fabric covered, rubber insulated wire has, for decades, been a difficult task. My current solution is to use braided piping used in the sewing crafts and in stringing large beads. The braid is made around a core of straight coarse threads. These threads can be easily pulled out of a 18 inch length to make a hollow, braided tube and it is not difficult to slide it over stripped bare 20 AWG stranded wire. Cotton piping can be dyed any color. A brushing of Dritz Fray Check tinted with your golden yellow or light oak dye gives a pretty good result. (This braid is not as dense as the real wiring braid but you really have to look close to see the difference.) Even better is to take your covered wire and wrap it up in loose hanks and submerge in a small beaker of clear flexible coating and pull a vacuum. The vacuum from a hand operated brake bleeding pump is all that is necessary. Remove from the liquid and drag thru a rag to squeegee off the excess material before hanging to dry.

Inside these small boxes there is just barely enough room to insert 2 or 3 nine Volt transistor radio batteries Type NEDA 1604. I say two or three. Most early radios if calling for two - 22½ Volt ‘B’ batteries will
take a tap at 22 ½ Volts to run the detector. The detector may not be happy with the 27+ Volts of three new 9 Volt batteries… You may find that it works acceptably on 18+ Volts from just two cells. There are three battery snaps installed and you just insert a dummy snap to bypass. The good news is that 5 nine Volt batteries still add up to the 45 Volts that is used for the audio amplifiers.

A card stock rectangular sleeve is glued to the inside of the box to keep the wiring in place for installation of the bottom cover.

The box assembly is now ready for filling with the red pitch potting compound. This seems to be the most difficult process for a home shop like mine. In reverse engineering how this might have been done in an efficient factory environment, I can think of no way that would not have required some sort of conveyor belt moving through a temperature controlled tunnel with infrared heating element stations along the way. The battery with its layer of ‘real’ pitch now cooled down would move into the tunnel where the cardboard around the top of the battery would be quickly brought up to a temperature of at least 140º F. At this point, the red pitch that has been heated to about 230º F can readily flow and soak into the cardboard and intimately coat the base of wires, terminal posts or Fahnestock clips. Next an area of the tunnel would bring the temperature of the red pitch down to room temp quickly. I thought that you would want the red pitch to come down to about 115º F at which point you would use the embossing dies to imprint the logo and terminal identification but that presents a problem. At this point, the internal pitch is even warmer so what happens is that the top surface just gets pressed into the softer core.

What does work is to have the red pitch return to room temperature. At this time you will see hundreds to thousands of tiny bubbles in the surface of the pitch. They are removed by exposing the surface to a blast of hot air at about 300º F for about 10 to 15 seconds. After returning to room temperature again, the top of the battery is placed very close to an infrared lamp to quickly (5 or 10 seconds) soften the surface pitch to about 120º F at which point the dies can be pressed into this soft top layer without the layer collapsing into the core material.

I made my embossing dies by making a silicone rubber casting of the embossing on the tops of existing vintage batteries in my collection. A silicone parting spray is applied to the resulting negative silicone mold and silicone rubber is poured over this negative mold to yield a positive silicone rubber mold. Into this positive silicone mold is poured urethane resin to produce a rigid embossing die. (Rigid enough for the 120º F of the red pitch ready for embossing.) Each character or line feature of the embossing die has a tiny vent hole drilled thru the back of the die to allow air to escape and the wax to fill the voids.

This pouring of the pitch proved to be the most difficult function. I used a double boiler setup made of an old electric coffee pot with disabled thermostat with a glass beaker suspended inside. Since I had to heat the red pitch to above the boiling point of water, I substituted vegetable oil. The temperature was controlled using a programmable temperature controller available on-line for less than $30. The problem with the glass beaker is that the rim of the beaker does not get as hot as the bottom. That makes it difficult to pour as the pitch is cooling down as it passes by. I did not have an appropriate sized heavy wall aluminum container to substitute for the beaker. The other problem of course is encountered when you lift the container out and you have the oil dripping off and onto everything. Also the pitch wants to dribble down around the lip of the container.

The next step would be to design a purpose built heated pot that maintains even temperature all the way out to a heated spout. I already have that designed and will build when parts arrive. You can buy on-line pots for heating candle wax but they simply will not work with a material as viscous as this red pitch.
So now you have your very authentic looking replicas. Depending on how you handle and display them, you still may scuff edges or otherwise accidentally dig into the graphic. Your first inclination may be to get colored permanent marker pens for touch-up. I find that these inks, while sinking into the damaged paper readily, do not look good when bleeding out over the edges of your touch-up. I find it is much more effective and easier to mix up the right color from a simple artist watercolor pan set (little briquettes of solid colors). Brush onto the exposed paper and then wipe immediately with a slightly damp pad of old cotton sheeting to sweep the excess color off the ‘doctored surface’. After the watercolor dries completely, give a light spray of satin acrylic lacquer.

Making replica 4.5 Volt flashlight batteries.

The first inventor of an ‘electric hand torch’ was by David Misell, a British inventor living in New York. One Conrad Hubert, manufacturer of electrical novelties, first saw Misell’s work in 1897. He was impressed with his work and bought all of Misell’s previous patents, workshop and brought to market the first tubular flashlight in 1899 under the Ever Ready brand. The tungsten filament lamp was scaled for use in flashlights in 1910 and by 1911, American Ever Ready was manufacturing two and three cell battery assemblies under the Eveready – Tungsten brand. By 1920 the Burgess Battery Company was selling equivalent batteries.

The nominal outside diameter of these cells are 1-5/16” (3.3 cm); the same diameter as current ‘D’ (IEC type R20) cells. That presents a problem for making replicas. One could simply take a thin laser printed paper sheet, spray on a little glue and roll up three modern cells inside. Unfortunately this would show the modern construction techniques of the tops and bottoms and the paper sheet would likely have to be discarded when the batteries were exhausted. That is simply not good enough for museum grade replicas in my opinion.

I elected to find a way to construct a reusable metal housing that would appear historically accurate from any point of view. This would mean that any replaceable batteries inside would be smaller and one might think, not last as long as the original. However battery efficiency has improved over the many decades to the point that a modern ‘C’ cell (R14) is almost equivalent to the 20s vintage ‘D’ cell in flashlight service. If you install alkaline ‘C’ cells, then the Ampere/hour capacity is substantially greater than the original ‘D’.

I discovered that thin-wall welded seam steel tubing with an O.D. of 1-1/4” matches perfectly the diameter of the zinc can used in the ‘D’ cell. These cells were then rolled into two layers of heavy black card stock, or pressed into an equivalent spiral paper tube, to yield the nominal O.D. of 1-5/16” diameter. This steel tubing is the size used for mounting light weight outside TV antennas.

I determined that a spring loaded, bayonet lock, end cap would be required to provide a hidden means of installing the replacement batteries. Since the stack of ‘C’ cells is ¾” less in height, I would need a bulkhead in the tubing for the positive contact.
I was pleased to discover that 1” welded seam electrical conduit (1” EMT) will slip into the 1-1/4” tubing with a 0.05” gap. Just enough to accommodate the lip of a spun steel cap made from 26 gauge galvanized sheet steel. This cap is used for the bayonet end cap and the bulkhead.

I had only done metal spinning twice before on restoration projects. I was happy to discover that spinning a small part like this is really very easy to perform on a 4” or larger lathe. (I have an old Atlas 6” lathe.) Within a few attempts, I was turning out parts with tight tolerances. Just a couple of minutes are necessary to spin and true the resultant lip.

Machining the bayonet path in the wall of 1” EMT conduit is the most difficult function (time consuming) for me to perform in my home shop. This would be an ideal part to assign to a CNC machining center but without assurances of a market for such replica batteries, I cannot justify the setup charges and minimum run requirements.

Once the parts are fabricated, assembly goes quickly with the use of three assembly jigs. The net result is a robust housing for any appropriate graphic.

Red pitch is poured into the top of the battery in the same manner as the “B” battery replicas.

The steel cylinder is wrapped with two layers of jet black card stock. Sixty to seventy % of the card stock is coated with spray contact adhesive. This makes it easy to roll the stock onto the cylinder very tightly. However, you cannot rely on the contact adhesive to remain adhered to the remaining 30 or 40% of the surface. Over time it will lift off because of the tension in the card stock. The simple solution is to brush on a thin layer of wood glue to complete the wrap and clamp against a dense foam sheet until it dries. Your laser printed graphic is on thin enough paper so that it will not lift off over time when bonded with the spray adhesive.

Production of the graphics for these flashlight batteries.

Vintage examples (before 1925) of these 4.5 Volt batteries have been located in the Eveready and Cyclone brands but I have yet to locate a vintage example of the Burgess battery. These vintage examples are not at all common and I am not willing to sacrifice one should it be located by peeling off the graphic and flatten so that it can be scanned on an ordinary scanner.

I therefore decided to fabricate a scanner for cylindrical surfaces. A few years ago before retirement from a small contract engineering business, we had accepted a project to do the electromechanical design of a scanner for labels on vintage wine bottles. I designed the mechanics and built 16 prototype scanners for their system evaluation. With that knowledge I was able to construct a much simplified scanner for round batteries. It works just fine. The graphic is converted to a 1200 d.p.i. image regardless of the native scan resolution of your scanner. (My rotary scanner does 300 d.p.i.) Most laser printers can accept images saved as a 600 d.p.i. PDF file but editing a 1200 d.p.i. image gives much easier control of ragged pixilated lines.

As with any such recreation of vintage graphics, the scanned image should only be used as a placement template for new graphic layers within a Photoshop composition. Fortunately for us, much of the text will be in a few common fonts.
that can be nearly fully customizable within *Photoshop*. By that I mean that the character height, width, ‘strength’ (Bold, italic, soft, crisp, etc.) and character spacing can be changed at will and be easily placed within 0.003” of your reference image. It is common to find that the modern text font you have selected will not comply completely with the original graphic. This usually shows up in letters like E, F, G, M, S & W. It is possible to create your own fonts but I have not found that to be necessary for these types of graphics. I simply modify a .jpg image of one of the ‘offending characters’ and then use the CLONE tool to paste over any non-complying character.

In the case of the Burgess battery (catalog number 232) where I have no known modern photos, I searched for advertisements, catalog cuts and pamphlets. Unfortunately prior to 1925 there appear to be no large format (magazine sized) photo images in color or B&W, only very small line art pamphlet images completely lacking in detail. The large format advertisements appear to be commercial art renderings designed to reproduce well as B&W images. There are, however, graphic themes evident that carry over into images seen on various iterations of small Burgess ‘B’ batteries and large #6 dry cells. By using this information as a guide, I feel that I have been able to recreate the graphics seen in the small pamphlet renditions.

The major manufacturers seem to always have placed some text declaring “Trade Mark”, patent references and locations of offices or manufacturing plants. For this battery, I can only surmise that at least some of the text would be similar to later similar one-cell flashlight batteries in their product line. It appears that this three cell version was not being promoted in their advertising after the late 1920s.

**Front end costs…**

After having gotten to the point where I now know how to make these replicas with the shop resources I have available, I built an Excel spreadsheet to itemize expenses…

My sort-of running head count thought the front-end expense of making the first 9 sets of replica batteries (2x ‘A’ and 2x ‘B’) would run between $300 and $400. So I was shocked to see that the real number had ballooned to $737.35! On certain items I paid the penalties of encountering minimum quantity orders and the fact that most items were ordered on-line from many different vendors. And it also includes $104 in materials obtained for failed experiments to try and recreate what I now know to be red pitch.

So this whole project has to be a matter of a labor of love. Of wanting to make it possible to help place some of our vintage collectibles in a fuller historical perspective. It also satisfied a curiosity about how these sorts of things were (or could be) manufactured. i.e. Reverse engineering. There were many ways I could have cut corners along the way. But the end result would be that anyone familiar with vintage batteries would be able to immediately recognize these as less-than-accurate replicas. The goal is for the observer to first regard them as just really good originals and move on to viewing the exhibit as a whole.

**THIS IS THE END OF THE DRAFT…**

**Additional information also not for reproduction.**

Hi,

After four months of work I now have the two pictures I have wanted to see…. A Radiola II containing original sets of Eveready and Burgess dry batteries.

I think I like the Eveready batteries more because these are two Eveready graphics styles that are rarely (maybe never?) seen today. Flashlight collectors know of the Eveready – Tungsten brand but it was new to me before my recent research. I was aware of the earliest graphic for Eveready ‘B’ batteries from the B&W advertisements in Radio News from 1921 to 1923 but had never seen a color picture until two larger versions of the battery showed up on e-Bay less than a month ago. (I have had an Eveready search set on e-Bay since at least 2010.)
This is a DRAFT paper not to be reproduced in any form.

There are certain details of my replicas that I cannot yet verify as correct from existing artifacts or vintage documentation.

**Eveready – Tungsten # 705 - 4.5 Volt flashlight battery.**

*Guarantee Expires* date panel:

The date of 5 24 is fictional. The only photo I have of this battery with a rectangular date panel is too fuzzy to reveal the date printed. I have a 1917 version of the graphic but the date panel is an oval instead of a rectangle. So, I do not know for sure when the graphic changed. I did not want to put a date code substantially before the date of the usage in the Radiola II.

**Eveready # 763 – 22 ½ Volt ‘B’ battery.**

This battery and the Burgess equivalent

The advertisements for these batteries while very accurate regarding the graphic label on the side of the battery, show no features on the top of the battery. One would expect to have seen the Eveready logo embossed in the potting compound and similar embossed terminal identifiers. A larger surviving #766 battery with identical graphics does indeed have the expected embossing in the potting compound. Therefore I took the liberty of applying the embossing.

I also do not know if the wire leads of this battery are color coded. I do know that there is a circa 1924/25 version of an Eveready 22 ½ Volt battery ‘for portable service’ that has a wire lead for the positive connection. This wire was red and, over time, fades to a dirty orange. I decided to provide the replicas with a Red positive wire and a Black negative wire.

It is my understanding that the Radiola II should have been released by the 1922 Christmas selling season but was not widely promoted until January of 1923. So it is entirely appropriate to use Eveready graphics of this type.

It appears that during early 1923 Eveready was looking to update their battery and graphics designs. For a brief period (18 months), we see the introduction of some ‘B’ batteries in lithographed tin cases. The graphic for pasteboard cases changes to one featuring a two-tower transmitting antenna but the logo panel is not situated between the two towers. The label is still applied to just one side of the box. I have yet to see a color photograph of this style battery. By early 1924 the logo panel is situated between the towers but is still apparently on only one side of the box. By November 1924, the pasteboard boxes are apparently wrap-around for all the #768 and 763 batteries.

**Burgess # 232 – 4.5 Volt flashlight battery.**

I have yet to see a modern photograph of this battery or its two cell version #222. The catalog and advertisement pages existent either show very small and fuzzy color line drawings or larger B&W advertisements…. None of the sources indicate if the logo is printed on one or both sides. These graphics also do not show any trade mark or patent information. The number of B&W stripe pairs seem to vary from 14 to 16. And, the logo appears to undergo some level of simplification over time.

There is a circa 1927/28 single cell existing today that clearly shows patent and trademark claims printed along four of the white stripes in black print and clearly shows that there are identical logos visible on front and back. However it is also clear that there are now 24 pairs of B&W stripes, far more than seen in earlier literature.

In order to move forward, I have elected to have two logos appear on my graphic on a field of 16 B&W stripes and to place one line of patent and trade mark claims text within a single white stripe.

**Burgess # 4156 – 22 ½ Volt ‘B’ battery.**