

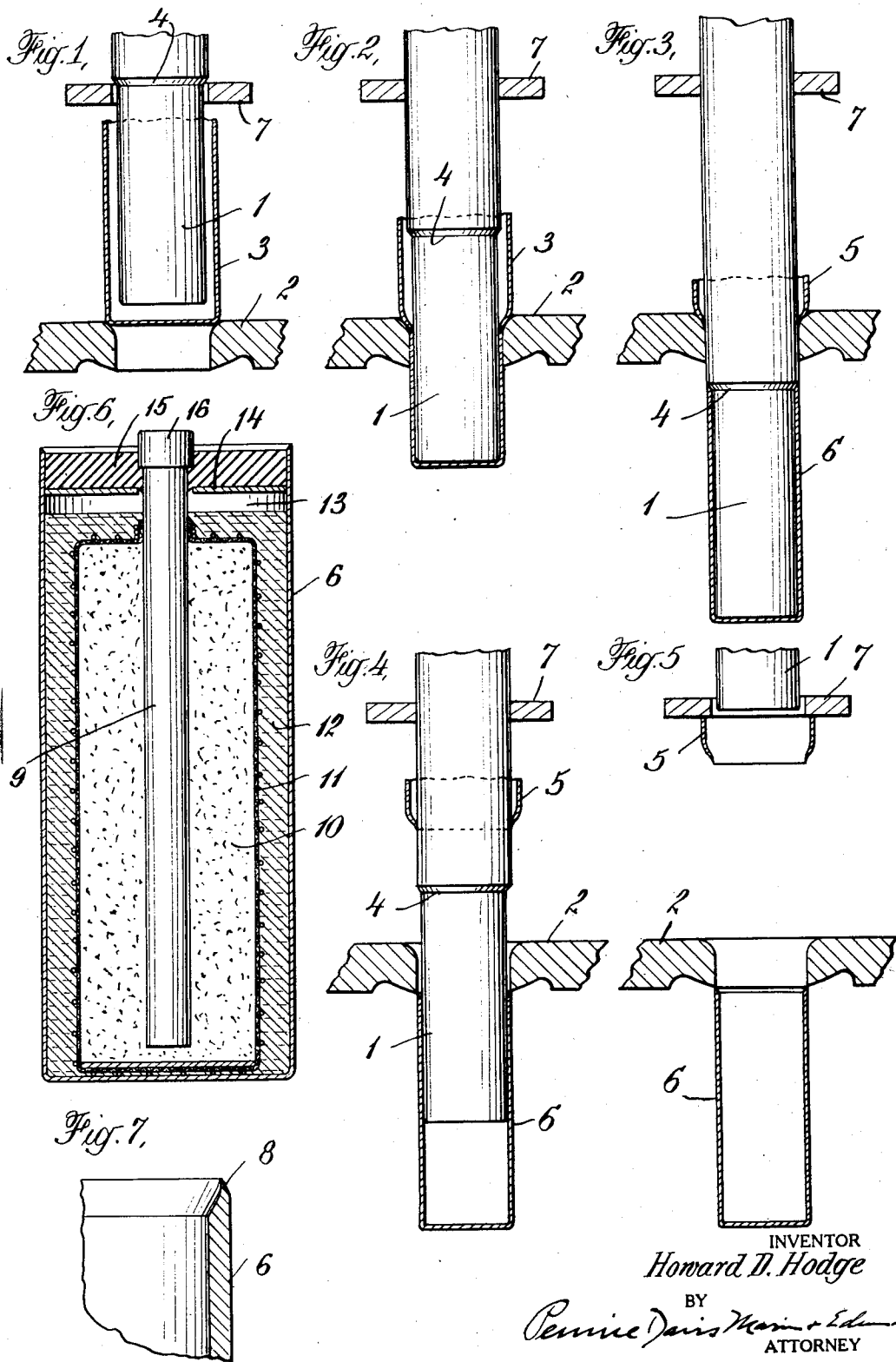
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DRY CELL ELECTRODE

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DRY-CELL ELECTRODE

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In the manufacture of dry-cells, such as are commonly used in battery hand lamps and in the radio industry, it is a common practice to provide a zinc electrode in the form of a seamless cup formed from a flat blank by a series of drawing, pressing or ironing operations. A suitable method for thus shaping zinc cups from a flat zinc sheet is disclosed in United States patent to L. Maisel, No. 1,375,305 issued April 19, 1921.

Such seamless zinc cups serve not only as one electrode of the galvanic couple, but also serve as a container for the more corrosive ingredients of the dry cell.

The succession of drawing or shaping operations through which a flat sheet of zinc must pass before it can be formed into the finished cup leaves a ragged edge around the top of the cup. It has been standard practice in the manufacture of drawn zinc cans for dry-cells to draw or form them to a length longer than is desired and then to cut the cup to its final dimension by trimming off the ragged irregular edge. This has commonly been done on a trimming lathe which cuts off the edge at right angles to the axis of the can.

Before such trimmed cans can be utilized in the manufacture of dry-cells, it is necessary to clean off the lubricant used on the zinc during the drawing operations. This can be done by placing the cells in bulk in a large rotatable cylinder and there tumbling them in the presence of a cleaning solution adapted to dissolve off the lubricant. However, this tumbling of the cups in large quantity is likely to, and often does, result in damaging the square trimmed edges of the cups, often forming small notches in the edge by forcing the metal inward, so that it protrudes as a small projecting ear, or roughness. Similarly, when the cleaned cans are dumped into barrels and are carted about, as a part of regular factory manipulation, or are dumped into bins for storage, the same defacement of the exposed edges of the cans is likely to take place, and often does take place.

This reduction in the effective diameter of the can, because of notches formed in the edge during previous handling of the can, often interferes with the speedy performance of subsequent operations. For example, it is customary to insert into the zinc cup a paraffined paper washer and when

there are inward projections on the edge of the cup they prevent the easy placement of the washer and sometimes make its insertion entirely impossible.

It is an object of the present invention to provide a dry-cell cup with its upper edge so bevelled or tapered as to facilitate the introduction of other elements of the cell, and so shaped that a blow on the edge of the cup, such as might be experienced by it in tumbling and rough handling, would show itself not as a lip or projection into the inside of the can, but as a mere turning over of the edge toward the outside of the cup.

It is a further object to produce seamless zinc cups of uniform length and without the irregularities necessarily incident to the hand manipulation now practiced for trimming the cups on a trimming lathe.

To attain the foregoing objects and others which will be made clear from the subsequent detailed description, I have devised a method whereby the trimming operation accompanies a drawing operation, preferably the last re-draw, that trimming operation being carried out by the dies used for drawing, those dies being so shaped as to pinch off the tube of metal after the cup has been shaped to the desired length and diameter. By thus correlating the trimming to the drawing there is a substantial saving in handling and in subsequent operations heretofore regarded as essential before the cup could be assembled into a dry-cell.

In the accompanying drawings, Figs. 1 to 5 inclusive represent different relative positions of a pair of dies in which a zinc cup is being formed and simultaneously trimmed. Fig. 6 is a cross section of a dry-cell embodying a seamless zinc cup with a bevelled edge, this representation being somewhat diagrammatic in so far as concerns the details of elements other than the cup. Fig. 7 is a fragmentary enlarged view showing the edge of a seamless cup that has been trimmed by pinching off the excess metal between a pair of dies like those shown in Figs. 1 to 5, inclusive.

Zinc is such a brittle metal that it cannot be shaped into dry-cell cups of usual dimensions without being passed several times through the shaping dies. This is explained at some length in the above identified Maisel patent.

After the flat blank has been sufficiently

cut, the re-draws can be effected in a punch press of usual construction, equipped with a pair of dies, like those shown in Fig. 1, where 1 is the plunger, 2 the ring co-acting therewith, and 3 the incompletely formed zinc cup. Plunger 1 instead of being cylindrical throughout, as in usual practice, is flared outwardly to form a shoulder 4, which, in conjunction with die 2, serves to shear or pinch off the upper ragged edge of the zinc can and thus effect the desired trimming and the desired bevelling of the edge.

Fig. 2 of the drawings shows the progress of plunger 1 into die 2 and shows how the zinc cup is drawn, or more strictly speaking is ironed, into the annular gap between the dies thus reducing the diameter of the cup and increasing its length. In other words, the clearance between dies 1 and 2 is substantially equal to the thickness of the zinc wall of the cup 3 of Fig. 1. After the plunger has progressed far enough through the die, its bevelled shoulder 4 comes into forcible engagement with the inner face of the moving zinc cup, and inasmuch as the diameter of the plunger above the shoulder 4 is substantially equal to the opening in die 2, there will be a shearing or pinching action on the relatively soft zinc with resultant complete severance of the end portion 5 of the cup, as shown in Fig. 3. On the return stroke of the plunger the trimmed zinc cup 6 engages the annular die 2, and by it is stripped from plunger 1 and is thus free to drop out of the machine. On completion of the upper stroke the severed trimming 5 strikes a stripper 7 and by it is removed from the plunger. All of the cups produced by such a drawing or redrawing action are of exactly the same length and have their edges neatly bevelled. Any subsequent tumbling or rough handling is not likely to produce an inward denting of the extreme outer edge of the cup to an extent greater than is indicated at 8 in Fig. 7. It would require a very hard blow on the edge of the cup to fold it inward far enough to lessen the effective inner diameter of the cylinder.

By thus leaving the seamless zinc cup with

a flaring upper edge, the subsequent factory manipulations are simplified.

In Fig. 6 the zinc electrode 6 serves as a container for the usual carbon rod 9, the depolarizing mixture 10 in its cheese-cloth envelope 11, and the gelatinized paste 12, as in usual practice. There is an air gap 13, and above the air gap and fitting snugly within the zinc cup is a paraffined paper washer 14 which encircles the carbon rod and serves as the bottom of a pocket into which pitch or sealing wax 15 may be poured in hot condition to form an air tight seal between the zinc cup and the carbon rod 9 and its brass terminal cup 16.

In factory operations on a large scale these paraffined paper washers 14 must be put in at a rapid rate, and when in position should lie horizontal and should fit snugly against the zinc wall. The bevelling of the zinc edge and the freedom from inwardly projecting tongues or corners of zinc contribute to the speed at which the washers can be inserted and lessen the danger that the washers will go in on a slant, or will be torn or bent in the operation of crowding them down over the brass cap 16 into their final position within the cup.

The relative sizes and proportions of the elements shown in Fig. 6 are not of importance, for the invention is applicable to dry-cells of differing shapes and sizes.

I claim.

1. The method of trimming dry-cell cups which consists in pinching off the excess metal simultaneously with the last re-draw substantially as described.

2. The method of trimming dry-cell cups and beveling the edges thereof which consists in pinching off the excess metal between co-acting dies at the time of the last re-draw and simultaneously forming a beveled edge.

3. The method of trimming dry-cell cups and bevelling the edge thereof which consists in pinching off the excess metal between outwardly flaring dies as a part of the operation of re-drawing.

In testimony whereof I affix my signature.

HOWARD DOUGLAS HODGE.