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G. A. LYON

2,770,034

METHOD OF COINING AND CUPPING METAL

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Fig. 1

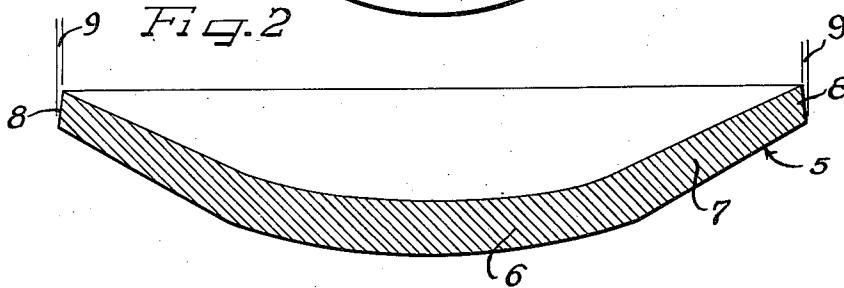
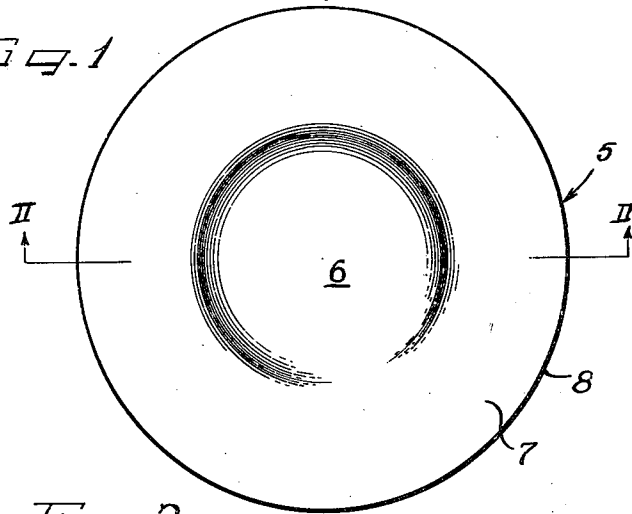
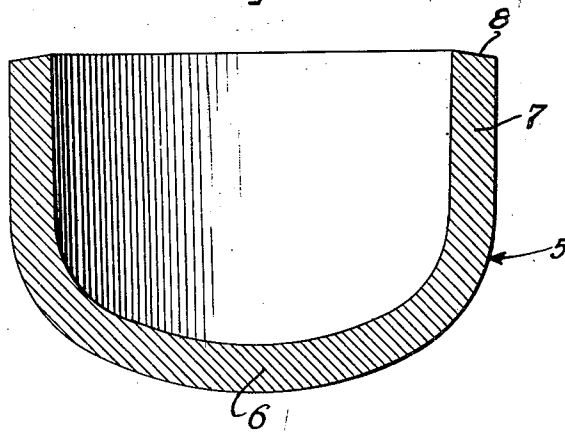


Fig. 3



Inventor
GEORGE ALBERT LYON

by *Hill, Sherman, Mason, Knapp & Simpson* Attys

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METHOD OF COINING AND CUPPING METAL

George Albert Lyon, Detroit, Mich.

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1 Claim. (Cl. 29—534)

The present invention relates to improvements of coining and cupping metal blanks especially of the kind used in the making of cartridge cases.

An important object of the present invention is to improve the coining and cupping of metal blanks in such manner that the cupping and subsequent drawing operations are substantially facilitated.

Another object of the invention is to so coin and prepare a metal blank for cupping and drawing that piling up or lateral protrusion of metal at the rim of the cup is avoided.

A further object of the invention is to prevent the formation of a hard hump at the outer edge of the rim of a cupped metal blank preparatory to drawing the same into a shell casing.

According to the general features of the invention there is provided in a method of coining and cupping a metal blank, the steps of coining a circular blank to provide a gradually diminishing thickness uniformly in the margin of the blank from a thicker central portion, trimming the periphery of the blank to provide a uniform peripheral bevel from one side to the opposite side of the blank, and cupping the blank by forcing the margin into cylindrical form from said opposite side and depressing the central portion of the blank into said one side.

A further feature of the invention comprises providing a circular blank for cupping, in which the central portion of the blank is of substantially uniform thickness, the marginal portion of the blank is of uniformly diminishing thickness from the central portion to the edge of the blank, and the edge of the blank has a bevel extending from one side to the opposite side.

Other objects, features and advantages of the present invention will be readily apparent from the following detailed description of a preferred embodiment thereof taken in conjunction with the accompanying drawing in which:

Figure 1 is a plan view of a metallic blank embodying features of the invention;

Figure 2 is an enlarged diametrical sectional view through the blank of Figure 1 taken substantially on the line II—II; and

Figure 3 is a sectional view taken in substantially the same plane as Figure 2 but showing the blank after it has been subjected to a cupping operation.

As shown on the drawings:

The improved method of the present case will be readily apparent from the following description of the various steps thereof involved in the blank shown in the drawings and identified generally by the reference character 5.

The blank 5 may be any appropriate metal such as steel or brass, or the like, suitable for making shell casings such, for example, as ordnance shell casings.

The blank 5 may be initially formed in circular disk form, or it may initially comprise a polygonal blank which is coined and then trimmed to the circular outline

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shown in Figure 1. However the case may be, the blank is coined to provide a central thickened or base portion 6 and an annular marginal portion 7 which is of gradually diminishing thickness from the thickened central portion to the circular periphery of the blank. By preference, the marginal portion 7 extends substantially frustroconically from juncture with the central portion 6 and the central portion 6 is of concave convex form so that the resulting coined blank is of substantially dished form.

A very important feature of the invention resides in so trimming the circular periphery of the blank that in subsequent cupping and drawing, formation of a laterally radially outwardly projecting hump on the outer side of the edge of the cup will be avoided. To this end, the circular periphery of the coined blank, as shown in Figure 2, is trimmed to afford an acute angle bevel 8 from the dished side of the blank toward the opposite or bulging side of the blank so that the diameter of the corner of the blank at the dished face side of the peripheral edge is of smaller diameter than the corner or side of the peripheral edge on the opposite or bulging side of the blank. This differential is indicated by the spaced lines 9. The diametrical differential between the two corners of the edge may be approximately .003 to .0035 inch in a blank wherein the total thickness of the blank at the peripheral edge is approximately .375 inch, although as shown in Figure 2 the differential may be substantially greater.

Thereafter the coined blank 5 is cupped as shown in Fig. 3 in the usual way, that is by pressing the blank through a coining die (not shown) by means of a coining punch (not shown) driving into the dished center portion of the blank. This causes the marginal portion 7 of the blank to be wiped into substantially cylindrical form as the marginal portion is drawn through the die. As a result of the progressive diminishing in thickness of the marginal portion 7 in the coined blank and the beveling of the edge 8 to the extent indicated in Figure 2, the edge portion of the cupped blank of Figure 3 remains of substantially uniform thickness throughout the cupping operation and without the formation of a lateral outward bulge as is experienced with conventional methods. The edge 8 remains substantially uniform and assumes a bevel that slopes from the inside outwardly as shown in Fig. 3. This substantially facilitates the drawing operation since in driving the blank through the die, the conventionally formed hump develops a resistance to the draw, and hardens the metal at the edge of the blank and thus at the cup which makes it brittle and it cracks and becomes rough so that it must be trimmed. The outward bevel as shown in Fig. 3 is subsequently valuable in that in subsequent draws as the cup is elongated into the desired case form, the bevel gradually straightens out as the metal is pulled or drawn into the elongated form and thus affords substantial relief against formation of a bead or lateral hump during the drawing. A more uniform cup is obtained economically and without waste.

The invention is especially applicable to the coining and cupping of blanks of unspheroidized steel. In an exemplary situation, such steel may be of 74-80 B scale Rockwell.

It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

I claim as my invention:

In a method of coining and cupping a metal blank, the steps of coining a metal blank to provide a blank of oversize diameter having a gradually diminishing thickness uniformly toward the peripheral margin of the blank from a thicker central portion, trimming the periphery

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of the blank to provide a smooth unbroken concentric circular peripheral edge with a uniform radially outwardly beveled surface extending from one side to the opposite side of the blank, and cupping the blank by simultaneously forcing the portion of the blank radially outwardly of said central portion into cylindrical form from said opposite side and depressing the central portion of the blank on said one side to provide a cylindrical cup side wall of substantially uniform thickness.

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