April 3, 1962 H. E. CLARK, JR 3,027,621

METAL SHOTGUN CARTRIDGE AND METHOD OF PRODUCING SAME

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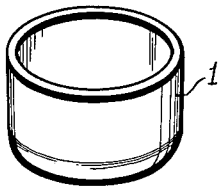


FIG. 1

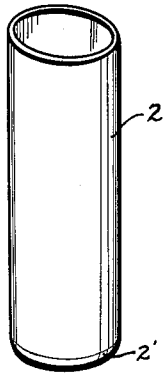


FIG. 2

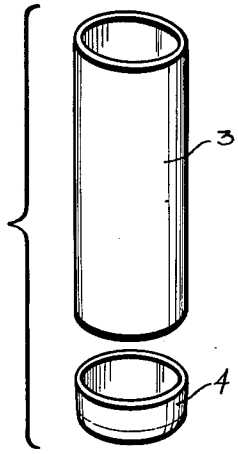


FIG. 3

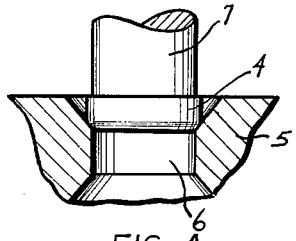


FIG. 4

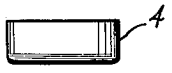


FIG. 5



FIG. 6

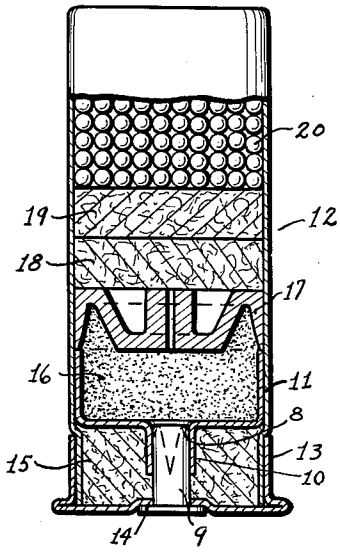


FIG. 7

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METAL SHOTGUN CARTRIDGE AND METHOD OF PRODUCING SAME

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This invention relates in general to shotgun cartridges and, more particularly, to a shotgun cartridge of metal construction and method for producing same.

It is an object of the present invention to provide a method for producing a shotgun cartridge of metal construction wherein the tubular casing and base wad overlay are produced from a single metal blank.

It is a further object of the present invention to provide a method for producing a shotgun cartridge of metal construction which is amenable to high-speed, economical production; which does not require time consumption in the heat treating or annealing of the various forming stages as requisite in procedures heretofore known; and which is productive of a cartridge fully reliable in performance.

It is a further object of the present invention to provide a shotgun cartridge having a metallic casing which may be of consistent, predetermined properties, thereby overcoming the production difficulties generally encountered in the use of paper for cartridge casings as resulting from variances in resistance to moisture, scuffing, and the like, and in toughness and other properties of the paper; and which cartridge incorporates a metallic base wad overlay for effectively confining the gasses of explosion so that gas leakage through or about the head is prevented.

Other objects and details of the invention will be apparent from the following description, when read in connection with the accompanying drawing (1 sheet) wherein—

FIGURE 1 is a perspective view of a cup formed from a metal blank.

FIGURE 2 is a perspective view of a closed-end cylinder drawn from the cup of FIGURE 1.

FIGURE 3 is an exploded view, in perspective, of the open ended casing and overlay blank drawn from the cylinder of FIGURE 2.

FIGURE 4 is an elevation view, in partial section, illustrating the overlay blank of FIGURE 3 as subjected to a redrawing die.

FIGURE 5 is a side elevational view of the overlay blank as redrawn.

FIGURE 6 is a side view, in partial section, of the fully formed base wad overlay from the overlay blank of FIGURE 5.

FIGURE 7 is a side view of a shotgun cartridge, a portion of the side wall being broken away, incorporating a casing and base wad overlay produced in accordance with and embodying the present invention.

In essence, the method of the present invention comprises, in sequence, the provision of a metal blank preferably of zinc, aluminum or of alloys of such metals, the drawing of such blank into a relatively wide, shallow, cup formation, the redrawing of such cup for diameter-reduction and elongation into a cylinder or shell form, the shearing of the cap or closed end portion of such cylinder for producing therefrom a casing and cup-shaped base wad overlay blank, trimming the end of the casing to desired length, then reducing the diameter of the sheared cap or overlay blank for snug-fitting reception within the casing, centrally piercing the end face of the overlay blank for completion of the base wad overlay,

and finally assembling the shotgun cartridge incorporating the casing and the base wad overlay formed from the original, single metallic blank.

Referring now by reference characters to the drawing which illustrates in a sequential manner the various forms produced during the performance of the method of the present invention for the ultimate production of a shotgun cartridge, **1** designates a relatively wide-mouthed cup drawn from a flat, metallic blank (not shown) as of zinc, aluminum or of alloys of such metals which blank has been cut to indicated size and subjected to a suitable drawing die; said latter may be of the well-known push-through character. It is to be recognized that, in accordance with accepted practice, the cutting of the blank into the predetermined size and the formation of cup **1** therefrom may be accomplished, if desired, in a single operation as by the utilization of a combination-type die. It is, however, to be specifically pointed out that the present invention resides in the method of producing the shotgun cartridge rather than the tools therefor, since it is within the competency of one skilled in the art to use various types of drawing or forming dies in performance of this method. Furthermore, the gauge of the metal worked in the present invention is not critical, as metals of varying gauges may be obviously used. For illustrative purposes only, it has been found that a blank having a thickness in the order of $^{25}/_{1000}$ of an inch would be preferable since the resulting shotgun cartridge elements therefrom would have desired strength and stability, and yet be of minimum thickness for marked economy.

Cup **1**, being comparatively shallow, is, subsequent to formation, subjected to a redrawing operation for reducing the diameter thereof and increasing the length so as to form a cylinder or shell **2** having a closed cap-forming end or a bottom **2'**.

The cap **2'** of said cylinder **2** will retain the original gauge, as $^{25}/_{1000}$, for instance, while the wall thereof, in being elongated, will be reduced to a thickness of about $^{11}/_{1000}$. It is understood that the extent of elongation will, of course, be dependent upon the length of the ultimate cartridge, and thus, the cooperating parts of the redrawing die must necessarily be designed accordingly.

The cap or closed end portion **2'** of cylinder **2** is then sheared so that cylinder **2** is reduced into two components, one being an open-ended casing or tubular member **3** and a shallow cup or overlay blank **4**. Casing **3** must, of course, be edge-trimmed to render the ends true, and this action may be undertaken after, or as a concomitant part of, the cap-shearing step, to present said casing **3** in predetermined length, whereby said casing **3** is then completely formed and ready for incorporation in the finished cartridge during assembly, as will be described hereinbelow.

Overlay blank **4** is then redrawn, as by subjection to a redrawing die of the push-through type indicated **5** in the figure having a die opening **6** and a cooperating punch or ram **7** for diameter reduction with limited, commensurate wall elongation so that the resulting outside diameter will correspond substantially to the inside diameter of casing **3** for reception therein for purposes presently appearing. The now diametrally reduced blank **4**, as shown in the figure, is then presented to a punch or other piercing instrument for providing an opening or aperture **8** in the end face thereof, said opening being sized for tightly receiving a primary battery cup **9**. The metal driven downwardly by the puncturing operation projects from the lower face of said blank **4** in sharp, pointed fingers **10** which will be circumferentially snugly disposed, in a tight sleeve-like manner, about the outer surface of battery cup **9** in the finished cartridge. Overlay blank **4** as now diametrally

reduced and pierced constitutes a fully formed base wad overlay bearing the designation **11** and is adapted for incorporation in the cartridge. Thus, from the original metal blank, cartridge casing **3** and base wad overlay **11** have been fully provided. It is apparent that the economy effected thereby is indeed obvious since substantially all of the metal blank is utilized in the fabrication of these two cartridge components with little or no waste.

Following the formation of the aforesaid casing **3** and base wad overlay **11**, the assembly of a cartridge as designated generally **12** may then be undertaken, following procedures well known in the art. The provision of a conventional flanged-head **13** as of steel, aluminum, brass, or the like, having a central base aperture **14** for engaging battery cup **9** is then tightly embraced upon the lower end of casing **3**. A base wad **15** as of fiber or the like is then disposed within the headed end of cartridge **12**, surroundingly of battery cup **9** and then base wad overlay **11** is rammed into position so that the fingers **8** are brought into engagement with the outer surface of battery cup **9** and fill the area encircling battery cup **9** between same and base wad **15** to provide a positive gas seal to prevent gas leakage about battery cup **9** and outwardly toward the flange of head **13**. The upper, or cup forming portion of overlay **11** is disposed upon the upper face of base wad **15** protecting same against deformation and distortion under the force of the gases of explosion as well as defining the limit of the chamber for the propellant charge so as to confine the gases thereof and thereby conduce to the development of maximum muzzle velocity and breech pressure.

To complete the cartridge assembly the propellant charge **16** is then received upon base wad overlay **11** with an obturating wad **17** surmounting same and thereabove are presented the customary filler or separator wads **18**, **19**. The missile charge **20** is provided above upper filler wad **19** and then the upper end portion of casing **3** may be folded inwardly or crimped for closing cartridge **12** and completing the assembly thereof.

It will be seen that the present method is one adapted for high speed operation and is not subject to the time consuming operations requisite heretofore in efforts to produce a metal cartridge wherein annealing or other heat treatment was required at periodic stages of the various forms developed in the course of the practice of the method. With brass or copper two or three draws have been required for a single step since such metals are hardened by the drawing process. By the use of zinc or aluminum such treatment is not necessary as the metal may be drawn to the required extents without undergoing an undesirable hardening.

The present invention is such that the sequential steps thereof might be effected by a single machine so that handling of intermediate forms would be obviated.

As indicated above, this method is exceedingly economical since it assures almost complete utilization of the materials of construction and produces a cartridge which will be consistently reliable, avoiding the defects inherent in the use of paper for cartridge tubing which has been heretofore the generally chosen material of construction, since the quality of paper will vary, is sensitive to atmospheric conditions and lacks the toughness to withstand rough handling.

It should be understood that changes in the methods, compositions, percentages, and combinations set forth may be made without departing from the nature and principle of my invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A method of producing components of a metal shotgun cartridge comprising providing a metallic blank, drawing said blank into a relatively wide shallow cup, then elongating said cup into a cylindrical shell, shearing the closed end portion of said shell therefrom to produce a tubular cartridge casing and a cup-shaped overlay blank, then reducing the outside diameter of the overlay blank for substantial correspondence with the inside diameter of the shell for snug reception therein, then piercing the end face of said blank to form an apertured sized for reception of a primer, and thereby completing the formation of a base wad overlay.

2. A method of producing a cartridge casing and a base wad overlay for a metal shotgun cartridge from a single metal blank comprising providing a metallic blank, drawing said blank into a relatively wide shallow cup of predetermined inside diameter, then elongating said cup into a cylindrical shell of predetermined length, shearing the closed end portion of said shell therefrom to produce a tubular cartridge casing and a cup-shaped overlay blank, then reducing the outside diameter of the overlay blank for substantial correspondence with the inside diameter of the shell for snug reception therein, then piercing the end face of said blank to form an aperture sized for reception of a primer, and thereby completing the formation of a base wad overlay.

3. A method of producing components of a metal shotgun cartridge as described in claim 1 wherein the tubular cartridge casing is edge-trimmed to predetermined length.

4. A method of producing components of a metal shotgun cartridge as described in claim 1 wherein the overlay blank is pierced, to form projecting finger-like members of the metal removed from the aperture provided, said members being adapted for engaging a primer on their inwardly directed surfaces.

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