

H. EHRHARDT.
MANUFACTURE OF CARTRIDGE CASES OF BRASS OR OTHER ALLOYS OF COPPER.
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1,024,840.

Patented Apr. 30, 1912.

Fig. 1.

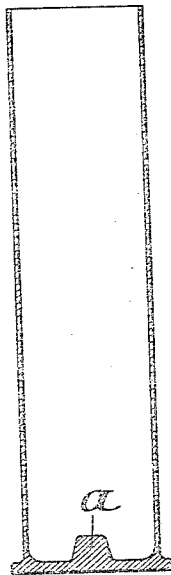


Fig. 3.

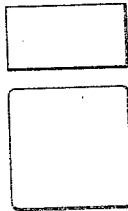


Fig. 4.

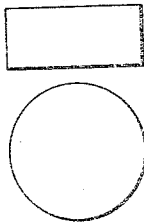


Fig. 2.

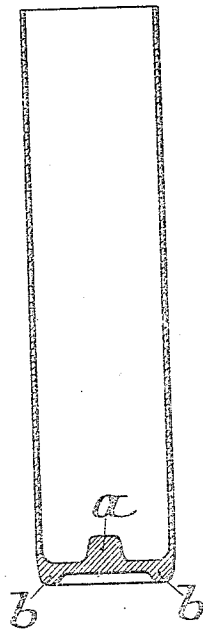
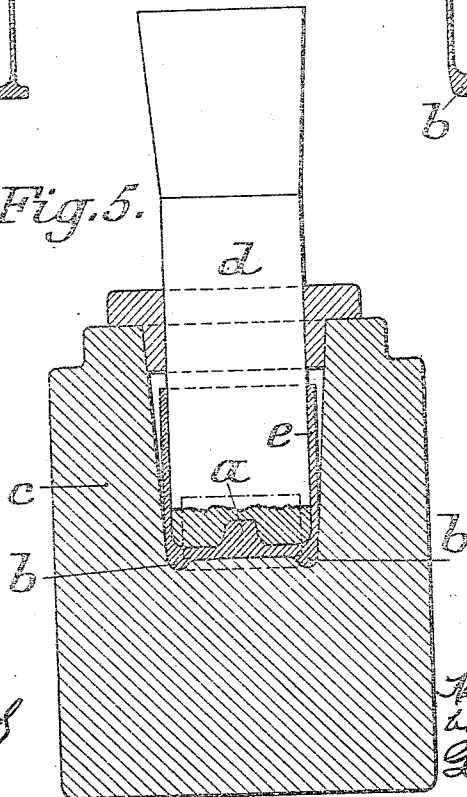


Fig. 5.



WITNESSES

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MANUFACTURE OF CARTRIDGE-CASES OF BRASS OR OTHER ALLOYS OF COPPER.

1,024,840.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HEINRICH EHRHARDT, engineer, a subject of the German Emperor, residing at 20 Reichsstrasse, Dusseldorf, Germany, have invented certain new and useful Improvements in the Manufacture of Cartridge-Cases of Brass or other Alloys of Copper; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The manufacture of cartridge cases both for infantry ammunition and particularly for cartridge cases for ordnance, of brass or other similar alloys of copper, is generally effected in such manner that a round plate stamped from a rolled bar of the metal and of essentially larger diameter than that which the finished cartridge case possesses, is transformed by means of known so-called stamping and drawing processes or also rolling processes in the cold way, into a short hollow body which is the initial product for the cartridge case, to be further formed from the same by drawing or rolling. In order to obtain with the thus formed cup, that is, the preliminary short hollow body, the requisite material in the base for producing the required sectional forms thereof, the plate must in the first instance be made comparatively thick, that is thicker than would be necessary if, for example, only the cylindrical part of the case required to be formed and no base required to be considered. In particular a considerable thickness is required, for example, for the central detonator chamber, which at the present time often requires to be made of considerable height and width. Furthermore, a considerable thickness also has to be provided in the base in order that at the edges where the plate has to be bent up for producing the case, a sufficient amount of material shall exist. At this point, or upon the entire base, a certain quantity of material is, in addition, required, in particular for cartridge cases for ordnance in most cases of the present day, where the cartridge case in its finished condition possesses a sufficiently strong outward projecting rim. The material for this rim must be provided in the first instance in the base, in order to be

pressed or rolled outward for forming the rim. In some cases the plate, before being converted to the cylindrical form, is specially worked at its middle portion corresponding to the subsequent base, in order to obtain at the requisite points, such as those above mentioned, the necessary accumulations of material, the upsetting of the outer rim of the flat plate into the cylindrical form being only afterward effected.

According to the present invention there is produced from the wrought metal plate by a single pressing operation a comparatively long hollow cylindrical body with base, which body by this single forging operation, at once receives a base profile, in which in the first instance there exist at the previously determined points the necessary accumulations of material, without causing the thickness at the other parts of the base to exceed the final dimensions to a greater extent than is requisite for the subsequent finishing operations. Also, the thickness of the directly formed cylindrical wall coincides approximately with the necessary thickness of the base at the thinnest part. Consequently, as compared with the method of transforming from a plate, there is also effected a saving in the additional necessary drawing operations. The transformation, according to the above described method, is rendered possible by the employment of a solid block of cylindrical or other prismatic form whose diagonal or diameter is smaller than, or at most as large as the diameter of the initial hollow body to be formed therefrom. The conversion of this solid block is effected while it is in a state of red heat, in which the material is considerably more plastic than in the cold condition.

It is to be understood that the term prismatic as employed by me is used in a generic sense to include the usual prisms and also a cylinder, the latter being considered in its mathematical sense as a prism having an infinite number of sides.

In the accompanying drawing Figure 1 shows a vertical section of a finished cartridge case for ordnance with the formed base and rim. Fig. 2 shows the cartridge case in the stage before the condition at Fig. 1, that is, it only requires the pressing or

rolling out of the rim in order to obtain from the form in Fig. 2 that in Fig. 1. In Fig. 2 the large detonator chamber *a* and an annular accumulation of material *b* is provided at the base. Figs. 3 and 4 show in elevation and plan the solid initial blocks, the first being of square shape with rounded corners, while the latter shows the block in the form of a cylindrical section. Fig. 5 shows the matrix *c* and the mandrel or die *d* in their relative positions after the initial hollow body *e* has just been pressed. The prismatic initial block is shown dotted in this figure. The detonator chamber which is formed directly by the pressing operation, is again designated by *a* and the accumulation of material for the rim to be formed later by *b*; *c* is the cylindrical part which is subsequently drawn out cold in the known way so as to be reduced in thickness.

I am aware that it has also been proposed to manufacture cartridge cases by pressure by subjecting a block of metal placed within a die to the action of a punch whereby the metal is forced up in the space between the die and punch which are dimensioned so as to leave an interspace corresponding in thickness to the socket case and I do not claim such a mode of manufacture generally as part of my invention, according to which the blank is pressed when at a red heat to form the base of the cartridge with thickened parts at the required places in a single operation.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:

1. The improved process of manufacturing tubular bodies from substantially iron free alloys of copper and zinc, which consists in preliminarily forging by compression while at a red heat and finishing by drawing while cold.

2. The improved process of manufacturing cartridge cases from substantially iron free alloys of copper and zinc, which consists in compressing a solid mass of the wrought metal while hot in a matrix to form a cup-shaped body and then finishing by drawing.

3. The improved process of manufacturing cartridge cases from substantially iron free alloys of copper and zinc, which consists in compressing a solid mass of the metal while red hot in a matrix to form a cup-shaped body with an excess of material at the base, and then finishing by drawing.

4. The improved process of manufacturing cartridge cases from substantially iron free alloys of copper and zinc, which consists in compressing a solid mass of the metal while at a red heat in a matrix to form a cup-shaped body having an amount of material at the base sufficient to supply

the flange and walls of the detonator chamber, and then drawing when cool to form the attenuated walls of the case.

5. The improved process of manufacturing cartridge cases from substantially iron free alloys of copper and zinc, which consists in compressing by means of a die a solid mass of the material at a red heat in a matrix having a diameter as great as that of the heated metal to form a cup-shaped body having a base with a profile corresponding generally with that of the finished case but with an excess of material sufficient to supply the flange and detonator chamber, and then drawing when cool to form the attenuated walls of the case.

6. The improved process of manufacturing cartridge cases, which consists in compressing a solid mass of brass containing no more than 35% of zinc while hot in a matrix to form a cup-shaped body, and then drawing when cool.

7. The improved process of manufacturing cartridge cases which consists in forcing a solid mass of an iron-free alloy of copper and zinc while red hot into a matrix having an interior diameter sufficient to receive the mass to form a cup shaped body having an excess of material at the base to supply the flange and walls of the detonator chamber, and then drawing while cold to form the walls of the case.

8. The process of forming cartridge cases of brass or other alloys of copper and zinc which consists in bringing to a red heat a solid block of the wrought material, the diameter of which does not exceed the desired diameter of the finished product, then drop forging the heated block to the form of a cup-shaped body having a base of the desired thickness with an annular flange and walls which are slightly thicker than the walls of the finished article, then permitting the cup-shaped body to cool, and then drawing out the walls to the requisite length and thickness and rolling out the annular rib on the base to form the rim.

9. The process of making cartridge cases, which consists in forming a prismoidal blank of cartridge metal consisting of copper and zinc the maximum diameter of which does not exceed the diameter of the finished product, heating said blank red-hot, and while red-hot pressing said blank between dies into a cylindrical cup-shaped body having a downward extending flange at its bottom, then cooling said metal, drawing out the walls of the cup-shaped body to form the walls of the cartridge case, and forcing the downward-extending flange outward radially to form the rim of the cartridge.

10. The process of making cartridge cases, which consists in forming a blank of cartridge metal consisting of copper and zinc,

said blank being a prismoidal body whose maximum diameter is not substantially greater than the diameter of the finished cartridge case, heating said blank red-hot, and while red-hot, forging said blank between dies into a cup-shaped body having a downward-extending cylindrical flange at its bottom and a projection to form a detonator chamber, then cooling said metal, drawing out the walls of the cup-shaped body to form the walls of the cartridge case, and then finishing the base.

11. The process of making cartridge cases, which consists in forming a prismoidal blank of cartridge metal consisting of copper and zinc, the maximum diameter of said blank being not substantially greater than the diameter of the finished cartridge case, heating said blank red-hot, and while red-hot pressing said metal between dies into a cylindrical cup-shaped body having a downward-extending cylindrical flange at its bottom and a projection to form a detonator chamber, then cooling said metal, drawing out the walls of the cup-shaped body to form the walls of the cartridge case and finishing the base.

12. The process of making cartridge cases, which consists in forming a prismoidal blank of cartridge metal consisting of copper and zinc, said blank having a maximum diameter not substantially greater than the diameter of the finished cartridge case, and having a cubic contents of metal substantially equal to that of said finished case, heating said blank red-hot, and while red-hot, forging said metal between dies into a cylindrical cup-shaped body having a downward-extending cylindrical flange at its bottom and an upward-extending projection on its inner face to form a detonator chamber, then cooling said cup-shaped blank, drawing out the walls of the cup-shaped body to form the walls of the cartridge case and then forcing the downward-extending cylindrical flange outward radially to form the rim of the cartridge case.

In testimony whereof I have affixed my signature to this specification, in the presence of the two witnesses.

HEINRICH EHRHARDT.

Witnesses:

WILLIAM ESSENWEIN,
ERNST ANDRÉ.