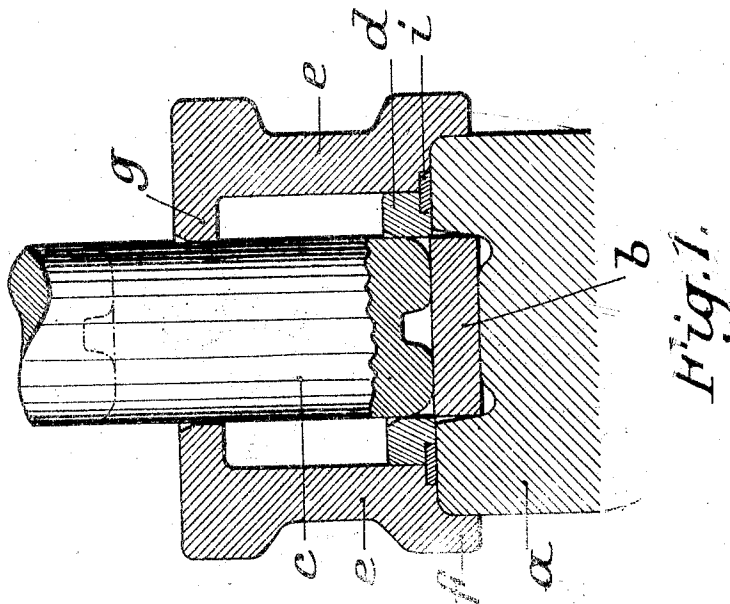
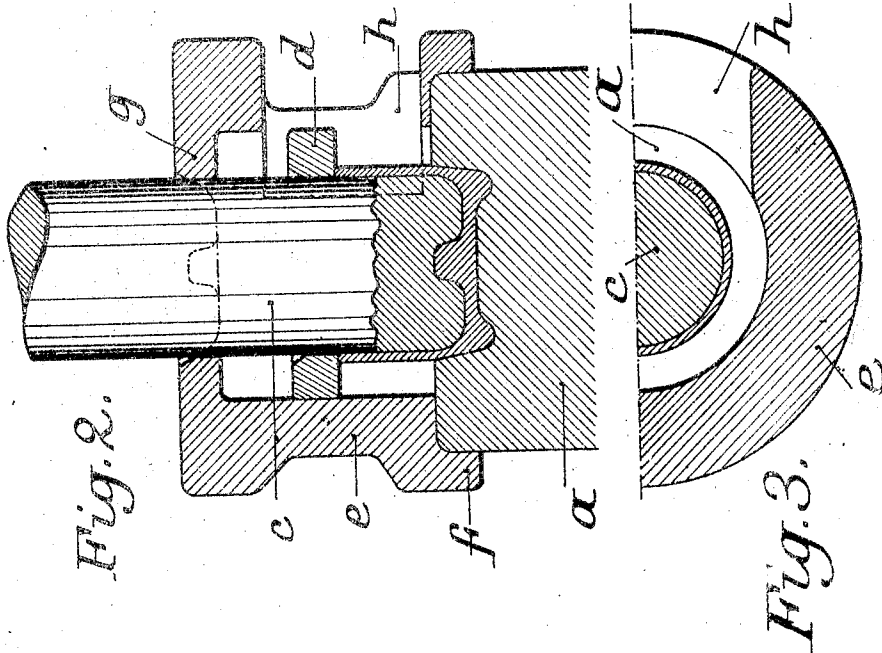


B. KNAEBEL.
MANUFACTURE OF HOLLOW BODIES.
APPLICATION FILED MAR. 15, 1911.

1,082,200.

Patented Dec. 23, 1913.



WITNESSES

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MANUFACTURE OF HOLLOW BODIES.

1,082,200.

Specification of Letters Patent.

Patented Dec. 23, 1913.

Original application filed January 4, 1910, Serial No. 536,309. Divided and this application filed March 15, 1911. Serial No. 614,653.

To all whom it may concern:

Be it known that I, BENEDIKT KNAEBEL, a subject of the German Emperor, residing at 3 Geistenstrasse, Dusseldorf, Germany, have invented certain new and useful Improvements in the Manufacture of Hollow Bodies; 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.

This application is a division of my companion application, Serial No. 536,309, filed Jan. 4, 1910.

This invention relates to improvements in the manufacture of hollow bodies, and more particularly of cartridge cases, from solid prismatic or cylindrical blocks of copper alloys, and it involves certain improvements on apparatus used in the process for the manufacture of cartridge cases of brass or other alloy of copper described in the specification of the application for patent in the United States filed December 15, 1905, the serial number of which application for patent is 291,938. In the said process care must be taken, that the temperature to which the blocks are heated in the heating furnace is not altered in a different degree during the successive operations. Therefore the pressing tools used in carrying the process into effect must be so constructed, that any unintentional delay is avoided when inserting the block into the die and removing the pressed blank from the same. Accordingly, the tools must be so constructed, that the block can not be placed edgewise into the die and that it is not necessary to center the same after once placing it into the die, which operation would cause an objectionable delay. As the mass of metal of the cylindrical portion of the cartridge case is small as compared to its diameter, and as the whole mass of metal of the case including its base is small as compared to the space occupied by the cartridge case, the transverse dimensions of the blocks subjected to the process are always comparatively large, while their heights are comparatively small, the former being generally a multiple of the latter. When placing such blocks of cylindrical or prismatic cross-section into the die, their position within the latter is frequently inaccurate in that they are sometimes located angularly to the axis of the die. The reason

for this is that, when using a die the axis of which is vertical, it is necessary to drop the block into the hollow of the die which on account of the height of the blank to be made is comparatively long, or when using horizontal dies, the block always tends to assume an incorrect position, even if it has beforehand been placed in correct position.

The object of the present invention is to provide a pressing apparatus of such a construction, that the block when being inserted into the die can assume only a position centrally of the die and coaxially with the axis of the pressing apparatus. With the block thus positioned, the flow of metal in the pressing operation to form the side wall of the hollow or cup-shaped blank is uniform on all sides of the die and the said side wall of the resulting blank is thus of uniform strength over its entire area and its axial dimension or height is also uniform around the whole circumference of the blank.

A die constructed in the manner described hereinafter is advantageous also in this respect, that the pressing operation can be continued without interruption, until the tools become so hot that they must be cooled by water or in a similar way.

For the purpose of explaining the invention more in detail an example embodying the same has been described hereinafter, reference being had to the accompanying drawing forming a part of this specification.

In said drawing Figure 1 is a vertical cross-section of a pressing apparatus showing a block within the cavity of the die and the punch in its position just before the pressing operation. Fig. 2 is a similar cross-section of an apparatus illustrating a modification of the apparatus and showing the punch and other parts in their positions at the end of the pressing operation, and Fig. 3 is a horizontal cross-section of Fig. 2.

The same letters of reference have been used in all the views to indicate corresponding parts.

Referring to the example illustrated in the drawing, a die *a* formed by a block of steel is formed with a cavity which is of slightly less depth than the block *d* to be subjected to the pressing process. Accordingly the said block when placed into the cavity of the die projects with its upper face above the upper face of the die. In the position of the parts shown in Fig. 1, the punch

5 *c* is located directly above the said block and in contact therewith. Bearing on the upper face of the die and surrounding the punch a ring *d* is provided which is adapted to slide on the punch without having an objectionable play thereon. The block *b* is either of circular or polygonal (square) cross-section, and its transverse dimension is such, that when being inserted into the die it is guided with its axial sides or its cylindrical surface within the bore of the ring *d*, so that it can get into the die only on a perfectly centered position. In order to more easily insert the block into the die the bore of the ring *d* flares outwardly at its upper end. As the cavity of the die is less deep than the block, the latter projects with its upper end beyond the die and into the bore of the ring at the beginning of the pressing operation, and only when the punch is forced downward and on the metal of the block is it entirely slipped out of the ring. By disposing the ring *d* immediately on the block also the punch is centered relatively to the block and the die to the last moment, provided that the ring *d* is held in a centered position. In the example illustrated the said centered position of the ring *d* is assured by means of a sleeve *e* surrounding the same and engaging with a concentric flange *f* the upper part of the die whereby it is held in centered position. The said sleeve is formed with a bore which is disposed axially of the pressing apparatus, and within the said bore the ring *d* is adapted to slide in an axial direction. At its upper end the collar *e* is formed with an inwardly projecting flange *g*, providing a suitable guide for the punch *c*.

40 In the improved die the pressing operation is performed as follows: While the punch is in its retracted position shown in dotted lines in Fig. 1, a block *b* at red heat is held above the upper aperture formed by the flange *g* and it is dropped. When thus falling downward it is guided within the bore of the flange *g* and it falls on the bore of the ring *d* through which it passes in a centered position, until it arrives in the position shown in Fig. 1 and at the bottom of the cavity of the die in which it still has a centered position. Now the pressing apparatus is started without delay, the punch *c* passes centrally through the guiding portion *g* of the sleeve *e* and it is again guided within the bore of the ring *d*. As soon as it comes in contact with the block *b* the pressure is exerted on the latter in the manner described above. The whole block is under pressure and it remains under the action of the said pressure until the metal reaches the annular space which is being formed by the descent of the punch between the latter and the wall of the cavity of the die. As soon as the metal has passed this annular

space the pressure on the same ceases. Simultaneously however the metal forming operation comes to an end, and therefore the metal is not torn or otherwise injured, as is quite common in working metal of a similar character in a state of red heat. Through the annular passage the metal rises around the punch *c* in the form of a hollow cylinder, and the ring *d* is raised thereby, as is shown in Fig. 2. The entire pressing operation is effected within a very short time, so that the metal hardly changes its temperature. At the end of such pressing operation the punch *c* is again retracted and the cup shaped blank slipped off the same by means of the ring *d*. Now the guiding sleeve *e* may be removed and the blank taken out of the die.

To prevent the ring *d* from dropping downward when the guiding sleeve *e* is removed and the cup shaped blank is taken off the die, an inwardly projecting ring *i* is secured to the lower side of the said sleeve *e*.

Fig. 2 shows a modification of the construction of the sleeve *e*. As shown in the said figure, the sleeve is formed with a lateral opening *h* of sufficient size to permit the removal of the pressed blank by means of a pair of tongs. Therefore it is not necessary to remove the sleeve *e* after each pressing operation. In a similar way the hot block can be inserted into the die through the said opening *h*, in which case the stroke of the punch can be reduced. The stroke of the punch required in this case is indicated in dotted lines in Fig. 2.

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. In an apparatus for shaping hollow bodies, the combination, with a punch, of a die having a relatively shallow cavity, and means exterior to said cavity for accurately centering a block of metal therein.
2. In an apparatus for shaping hollow bodies, the combination with a punch, of a die adapted to receive a solid block, and an axially movable guide ring centrally located on said cavity of the die and providing a guide for said block while being inserted into the die and for said punch while advancing toward the block, said guide ring being adapted to be lifted from its seat by the metal forced outward of the die by the pressing operation.

3. In an apparatus for shaping hollow bodies, the combination with a punch, of a die adapted to receive a solid block, and an axially movable guide ring located on said cavity of the die and providing a guide for said block while being inserted into the die and for said punch while advancing toward the block, said guide ring being adapted to be lifted from its seat by the metal forced

outward of the die by the pressing operation, and means to center said guide ring on the cavity of the die and providing an axial guide for said guide ring.

5 4. In an apparatus for shaping hollow bodies, the combination with a punch, of a die adapted to receive a solid block, and an axially movable ring located on said cavity of the die and providing a guide for said
10 block while being inserted into the die and for said punch while advancing toward the solid block, said guide ring being adapted to be lifted from its seat by the metal forced outward of the die by the pressing opera-

tion, and a sleeve on said die adapted to 15 center said guide ring on the cavity of the die and providing an axial guide for said guide ring, said sleeve having a lateral opening permitting the insertion of the block into the die and the removal of the 20 pressed article through the same.

In witness whereof I have hereunto set my hand in presence of two witnesses.

BENEDIKT KNAEBEL. [L. s.]

Witnesses:

OTTO KÖNIG,

CHAS. J. WRIGHT.