No. 796,223. PATENTED AUG. 1, 1905.

G. KAUB.

PROCESS FOR THE MANUFACTURE OF SEAMLESS METALLIC HOLLOW BODIES BY MEANS OF MATRIX AND DIE.

APPLICATION FILED JULY 9, 1903.

Fig. 1.

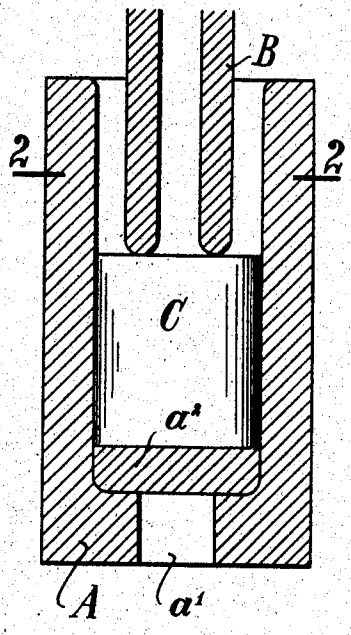

Fig. 3.

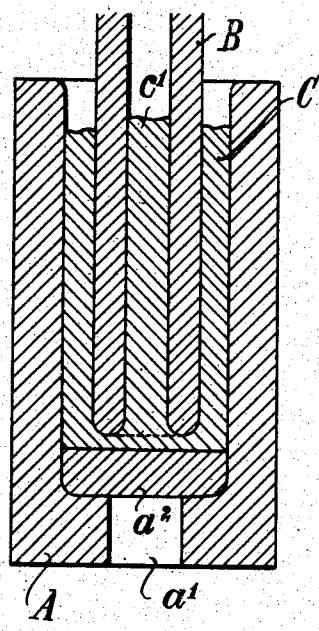

Fig. 4.

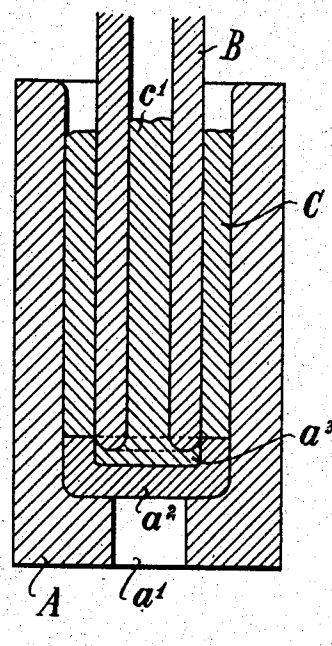

Fig. 2.

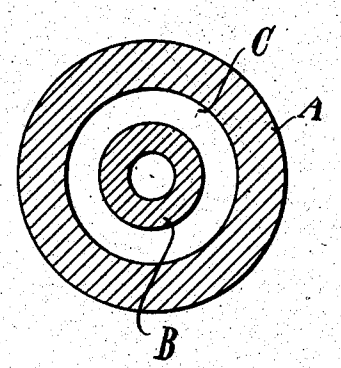

Fig. 5.

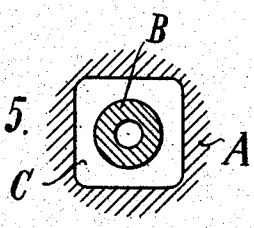

Fig. 8.

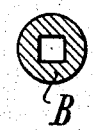

Fig. 6.

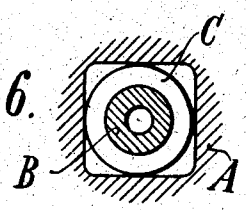

Fig. 9.

Fig. 7.

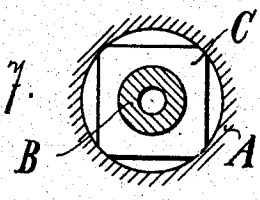

Fig. 10.

Witnesses:
Harold Hurd
E. M. Berwick

Inventor:
Georg Kaub
By Knight Bros
Attys

ANDREW. B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

GEORG KAUB, OF ESSEN-ON-THE-RUHR, GERMANY, ASSIGNOR TO FRIED. KRUPP, OF ESSEN-ON-THE-RUHR, GERMANY.

PROCESS FOR THE MANUFACTURE OF SEAMLESS METALLIC HOLLOW BODIES BY MEANS OF MATRIX AND DIE.

No. 796,223. Specification of Letters Patent. Patented Aug. 1, 1905.

Application filed July 9, 1903. Serial No. 164,882.

To all whom it may concern:

Be it known that I, GEORG KAUB, a subject of the Emperor of Germany, and a resident of Essen-on-the-Ruhr, Germany, have invented certain new and useful Improvements in Processes for the Manufacture of Seamless Metallic Hollow Bodies by Means of Matrix and Die, of which the following is a specification.

The invention relates to the process of manufacturing seamless metallic hollow bodies in which a heated metallic block is introduced into a matrix and perforated by means of a press-die. In processes of this kind heretofore employed a solid die has been used; but since a body of material must be forced out of the metal being worked corresponding to the volume of the penetrating die it follows that with a solid die a comparatively greater amount of pressure is required. In order to reduce this pressure as much as possible, the present process employs a hollow press-die for the manufacture of seamless metallic hollow bodies.

The present invention will be understood upon reference to the accompanying drawings, in which—

Figures 1, 3, and 4 are vertical sectional views showing progressive steps in the process of punching out a core by the present process in the manufacture of a seamless hollow metallic body, and Fig. 2 is a horizontal section on the line 2 2 of Fig. 1. Figs. 5 to 10, inclusive, are horizontal sectional views suggesting some of the various forms of seamless bodies that may be produced according to the present invention.

Referring more particularly to Figs. 1 to 4, which relate to the production of a hollow cylindrical body, A represents the matrix, which is turned out in the form of a cylinder with such an internal diameter as will permit the metallic block to fit accurately within it. In the base of the matrix is provided an opening a', which is covered by a plate a^2, Figs. 1 and 2. Above the matrix is the press-die B, secured to the piston of a hydraulic press or the like. This press-die is constructed with an annular transverse section and is so guided in its movements that it remains coaxial with the matrix. After the heated metallic block C is introduced into the matrix, as shown in Fig. 1, the press is put under pressure and the die D presses gradually into the work C. By the penetration of the die a portion of the material corresponding to the volume of the entering die is displaced and flows upward in the bore of the die, as well as in the matrix outside of the die. When the die has reached a position a short distance from the base-plate a^2, as shown in Fig. 3, it is withdrawn and the work is removed from the matrix. The last-named step is accomplished through means of a lower die, which enters through the opening a' of the matrix and raises the plate a^2. Finally the core c' is removed in a suitable manner—as, for instance, by the use of a hollow drill or by punching out the base. This core might also be removed in the pressing operation by a special construction of base-plate. Such an arrangement is shown in Fig. 4, where the base-plate a^2 is provided with a recess a^3, in which the end of the press-die may enter at the completion of its stroke. In this way, it will be observed, the core c' is sheared off from the material of the tubular wall, so that a hollow tubular body results from the simple action of the press.

If it is desired to produce a hollow body closed at one end, the press-die is caused to penetrate to a point distant from the base-plate a^2 corresponding to the strength desired for the closure of the end of the bore, and the core c' is then separated from the base in a suitable manner—as, for example, by the use of wedges.

From the foregoing description of the invention it will be obvious without further description that in comparison with a solid press-die a hollow die, by reason of its lesser volume for a given diameter, requires a very much less pressure and expenditure of work. Consequently smaller presses may be employed for the manufacture of comparatively large tubular bodies. A further advantage arises from the use of a hollow press-die in that with cast metallic blocks from which it is desired to construct seamless tubular bodies by pressing the central portion of the block, which often contains porous metal or imperfections, is removed by the hollow press-die and only sound material is forced into the walls of the completed article.

Obviously the cross-section of the article to be produced may be of any desired shape by suitably selecting the form of the matrix and

of the die. Various shapes are suggested in Figs. 5 to 10, inclusive. It will be observed that the exterior form need not correspond with the interior and also that the metallic block introduced into the matrix before pressing need not correspond with the form of the matrix. A round block might be introduced into a square matrix, as shown in Fig. 6, or a square block can be introduced into a round matrix. In such cases the pressing operation will cause the metal to flow into the unfilled space or spaces between the block and the matrix.

Having thus described the invention, the following is what is claimed as new therein:

The process of producing seamless metallic hollow bodies which consists in inclosing a suitable block of metal in a matrix, then forcing a hollow die into the block and finally removing the core formed within the die.

The foregoing specification signed at Düsseldorf this 26th day of June, 1903.

GEORG KAUB.

In presence of—

PETER LIEBER,

WILLIAM ESSENWEIN.