No. 724,270. PATENTED MAR. 31, 1903.

H. EHRHARDT.

APPARATUS FOR PRODUCING TUBULAR BODIES.

APPLICATION FILED JULY 28, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

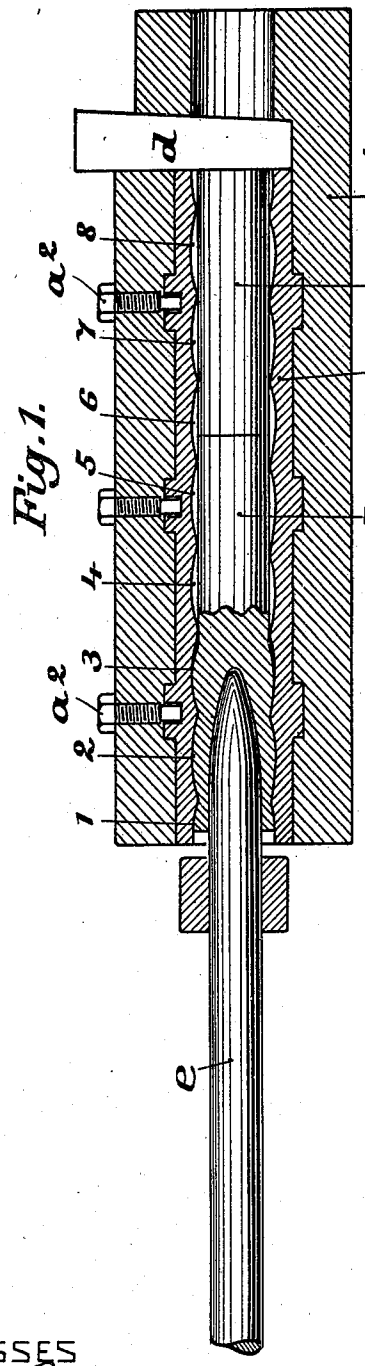


Fig. 1.

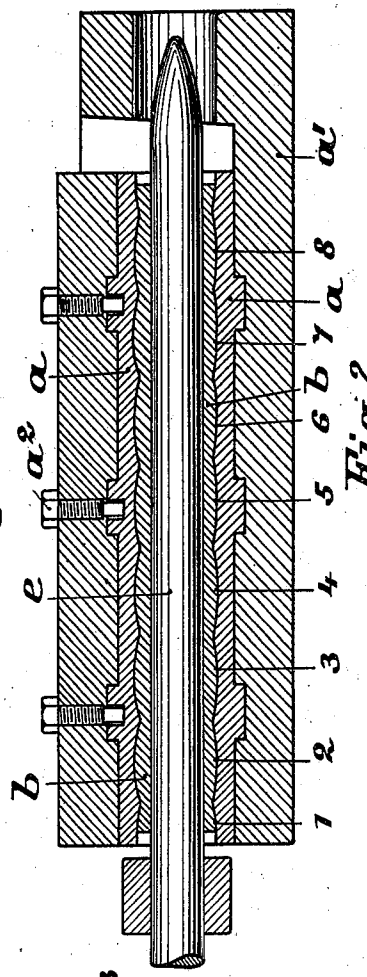


Fig. 2.

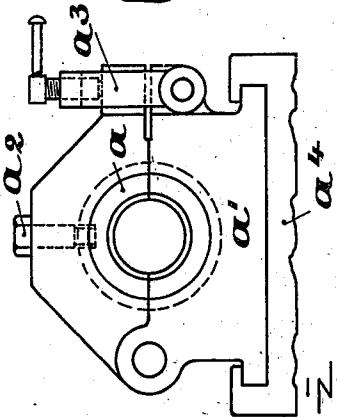


Fig. 3.

WITNESSES

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Fig. 4.

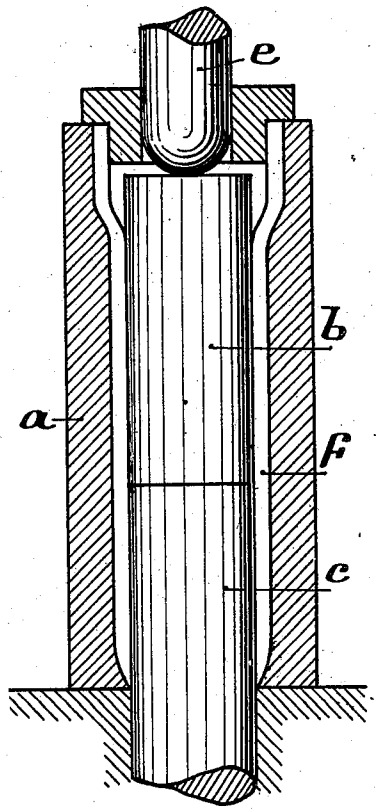


Fig. 6.

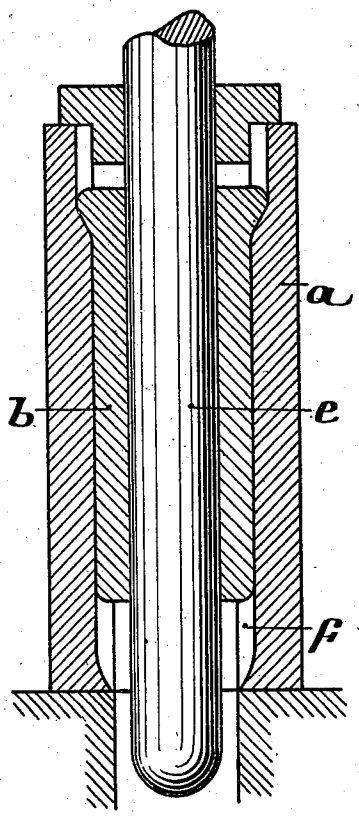


Fig. 5.

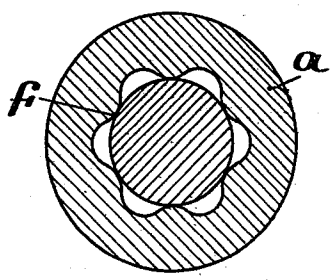
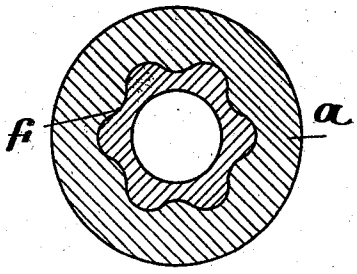


Fig. 7.



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UNITED STATES PATENT OFFICE.

HEINRICH EHRHARDT, OF DUSSELDORF, GERMANY.

APPARATUS FOR PRODUCING TUBULAR BODIES.

SPECIFICATION forming part of Letters Patent No. 724,270, dated March 31, 1903.

Application filed July 28, 1902. Serial No. 117,329. (No model.)

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 Means for Producing Tubular Bodies, of which the following is a specification.

My invention relates to the manufacture of hollow bodies, such as tubes and the like; and it consists in certain apparatus for the said purpose, to be hereinafter described.

The object of this invention is to produce hollow bodies by piercing an original piece or blank is such a manner as to considerably increase its length.

The invention comprises certain apparatus for producing this result, to be now described in detail with reference to the accompanying drawings, of which—

Figures 1 and 2 are longitudinal sections showing the preferred form of apparatus in different stages of operation. Fig. 3 is an end view of the apparatus. Figs. 4 and 5 are longitudinal and cross sections, respectively, of a modification; and Figs. 6 and 7 are longitudinal and cross sections of the same modification, showing the apparatus in a different stage of the operation.

The same characters of reference indicate the same parts in all the figures.

a is a matrix made of sufficiently resistant and refractory material, preferably of steel, and forming the interior lining of a strong case or box *a'*. As will be seen by reference to Fig. 3, the case and lining are made in two parts, preferably hinged together and secured in the operative position by a clasp a^3, the lining being, moreover, secured against displacement by screws a^2.

b is a blank or piece of metal to be operated upon, and *c* is a counter-piece adapted to secure the position of the blank *b* during the initial part or stage of the operation to be presently described.

d is a wedge employed in some cases to secure the position of the counter-piece *c*.

Along the interior of the matrix *a* a number of shallow recesses or grooves 1 to 8 are provided, into which the material is forced during the operation, and *e* is the mandrel, guided so as to move in a line as nearly as possible coincident with the axis of the matrix.

In carrying out the operation according to the present invention I proceed as follows: The blank to be operated upon is prepared so as to fit loosely into the matrix and is made so much shorter than the tube finally to be produced that the amount of material deducted from its future length is substantially equal to the amount to be displaced by the entrance of the mandrel. It is then placed in the matrix after being softened sufficiently by heating, and the counter-piece and wedge are put in position, as shown in Fig. 1. Then the mandrel is pushed into the hot material and presses the latter into the recesses formed on the interior of the matrix, whereupon the wedge and counter-piece are removed. Upon further advance of the mandrel the material retained by the first recesses, as 1 to 3, is pressed into the further recesses and is simultaneously stretched to a considerable extent, as compared with the original length of the blank. This is the stage of operation illustrated in Fig. 2. In this figure I have shown a case in which it is intended to form a regular tube open at both ends; but if I desire to produce a tubular body having a closed bottom it will be readily understood that I only need prepare the dimensions of the blank accordingly and to regulate the extent of advance of the mandrel so as to only approach the end of the blank more or less instead of passing through it. I have, moreover, found by experiment that this method of proceeding permits the use of a thick mandrel, so that a single operation will suffice for producing a longer tubular body with much thinner walls. The swelling produced on the exterior of the tubular body by the above-mentioned cavities or recesses 1 to 8 can be subsequently removed, if desired, by any suitable known means, as by rolling or drawing, as will be readily understood by those familiar with the art.

In some cases, and especially with some materials, I find that the blank has a certain tendency to twist or become displaced in the sense of a rotary movement. In such cases I prefer to use the form of matrix illustrated in Figs. 4 to 7. As will be seen by refer-

ence to these figures, in this modification the matrix is provided with only one concentric groove or recess or widened part, which is formed near or at the entrance to the matrix, and, moreover, with a number of longitudinal grooves or recesses *f*. (More clearly shown in the cross-sections Figs. 5 and 7.) It is found that not only do these longitudinal grooves effectually prevent any twisting action, at the same time effecting a more perfect centering of the material than in the form of matrix, shown in Figs. 1 to 3, but also increase the friction of the material in the matrix to such an extent that only one concentric groove or recess is required.

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 producing tubular bodies of greater length than the blank operated on, the combination with a tubular matrix having interior recesses, of means adapted to be inserted in the matrix, and a device for holding the same stationary therein to prevent displacement of the material to be operated upon during the initial stage of the operation, such means being removable during the operation, and a mandrel centrally guided with relation to and adapted to be forced into the said matrix.

2. In an apparatus for producing tubular bodies the combination of a tubular matrix having an interior concentric groove, and a series of longitudinal grooves, means for preventing displacement of the material to be operated upon within the matrix, such means being removable during the operation and a mandrel centrally guided with relation to the said matrix and adapted to be forced into the matrix.

3. In an apparatus for producing tubular bodies the combination of a tubular matrix having an interior concentric groove and a series of longitudinal grooves, a counter-piece adapted to be inserted in the matrix to prevent displacement of the material operated upon during the initial stage of the operation, means for securing said counter-piece in position, said means being removable from said matrix during the operation, and a mandrel centrally guided with relation to the said matrix.

4. In an apparatus for producing tubular bodies the combination of a tubular matrix having an interior concentric groove and a series of longitudinal grooves, a counter-piece adapted to be inserted in the matrix, a wedge adapted to prevent displacement of said counter-piece during the initial stage of the operation, and a mandrel centrally guided with relation to the said matrix.

In testimony whereof I have affixed my signature in presence of two witnesses.

HEINRICH EHRHARDT.

Witnesses:
WILLIAM ESSENWEIN,
PETER LIEBER.