

No. 756,404.

PATENTED APR. 5, 1904.

E. POLTE.  
METHOD OF MAKING HOLLOW METAL ARTICLES.

APPLICATION FILED AUG. 20, 1902.

NO MODEL.

Fig.1. Fig.2. Fig.3. Fig.4. Fig.5. Fig.6.

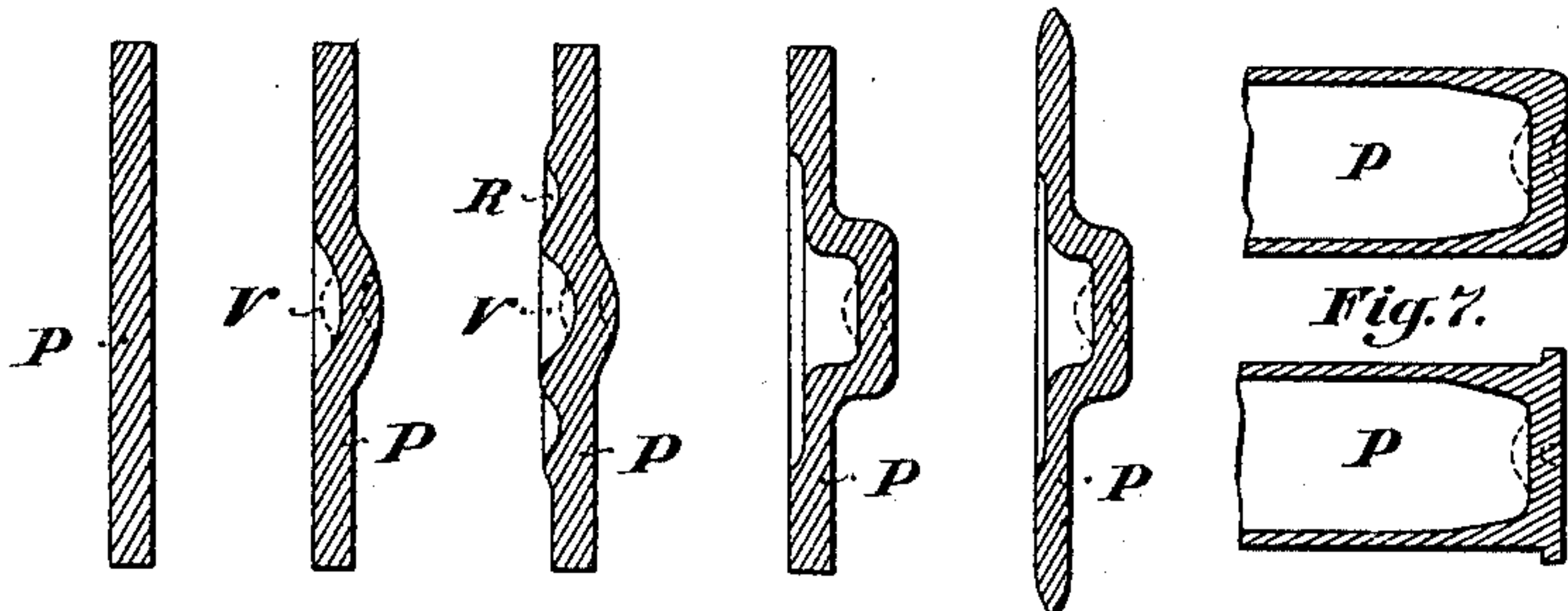


Fig. 8.

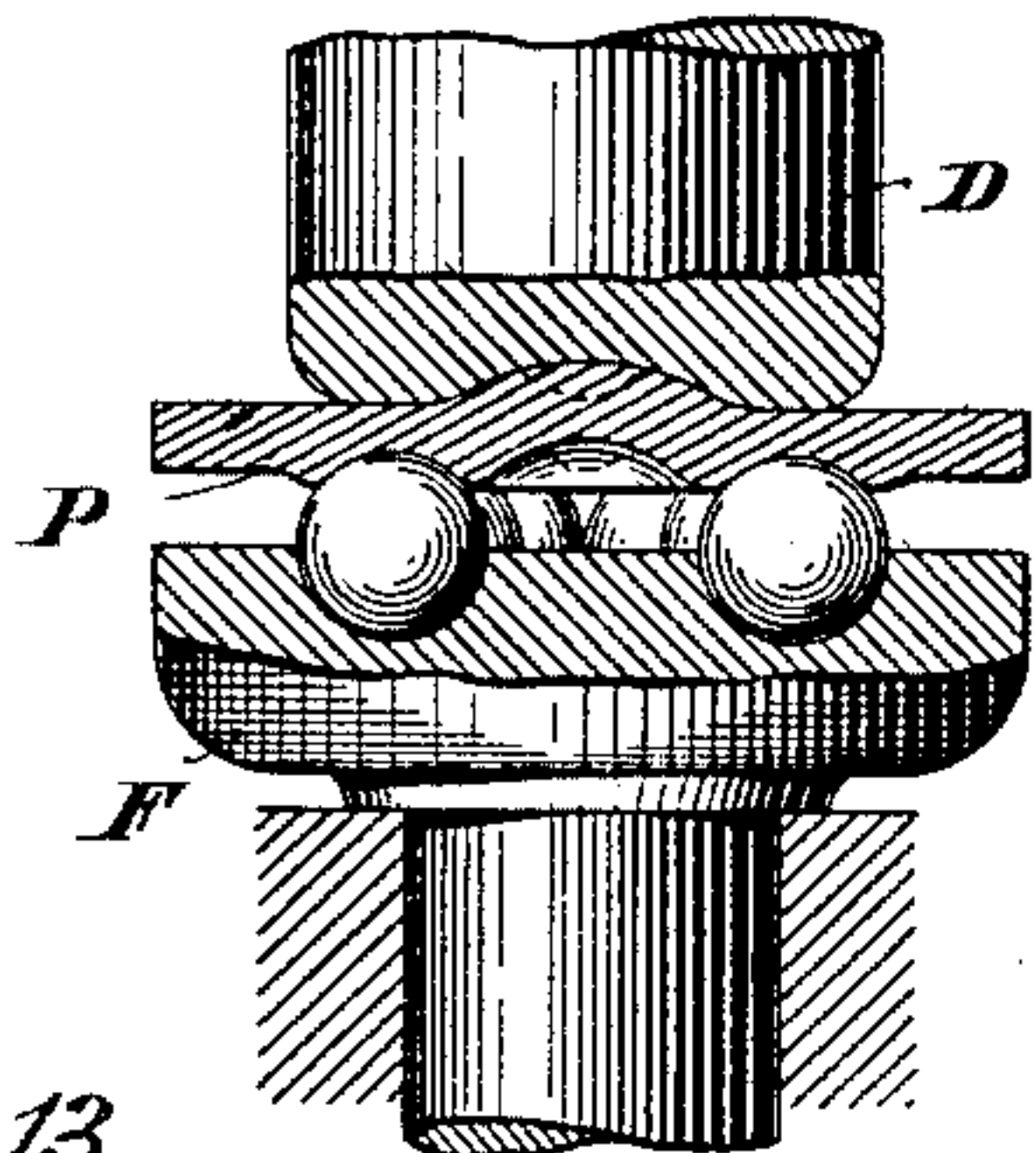


Fig.9.

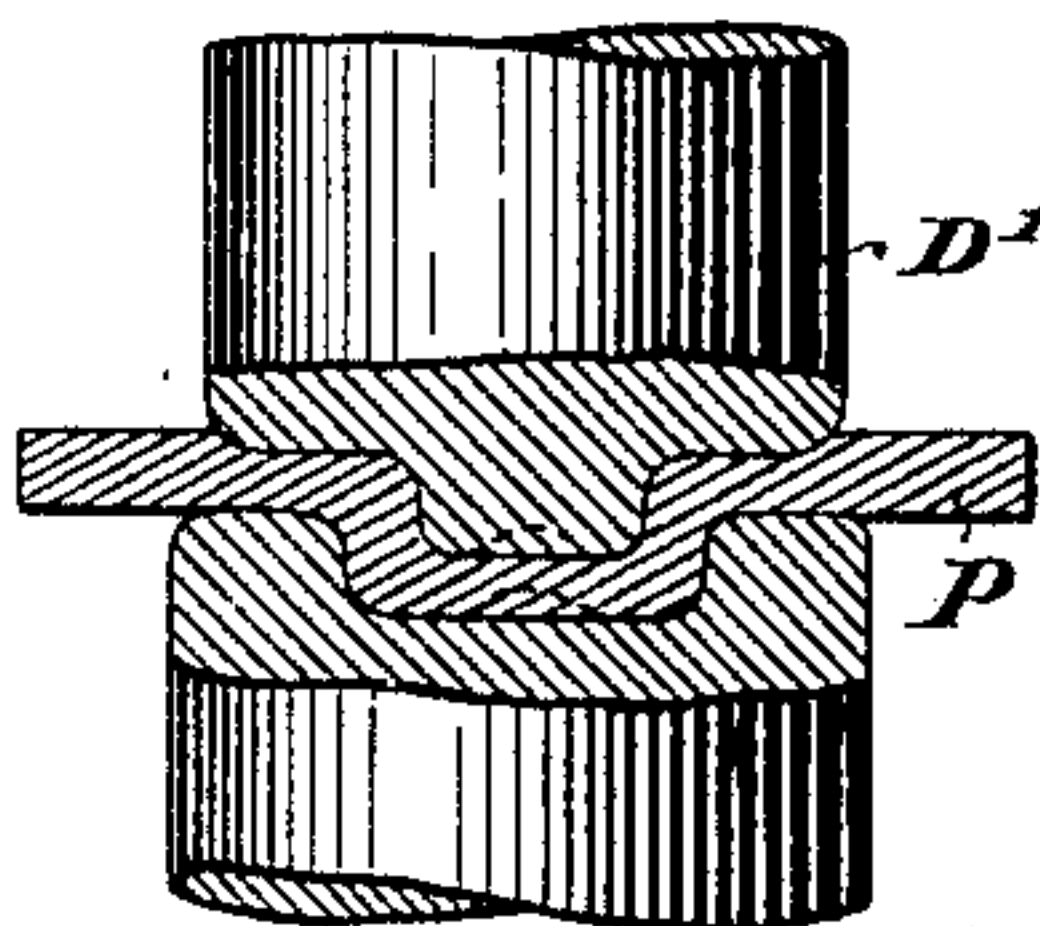


Fig.10.

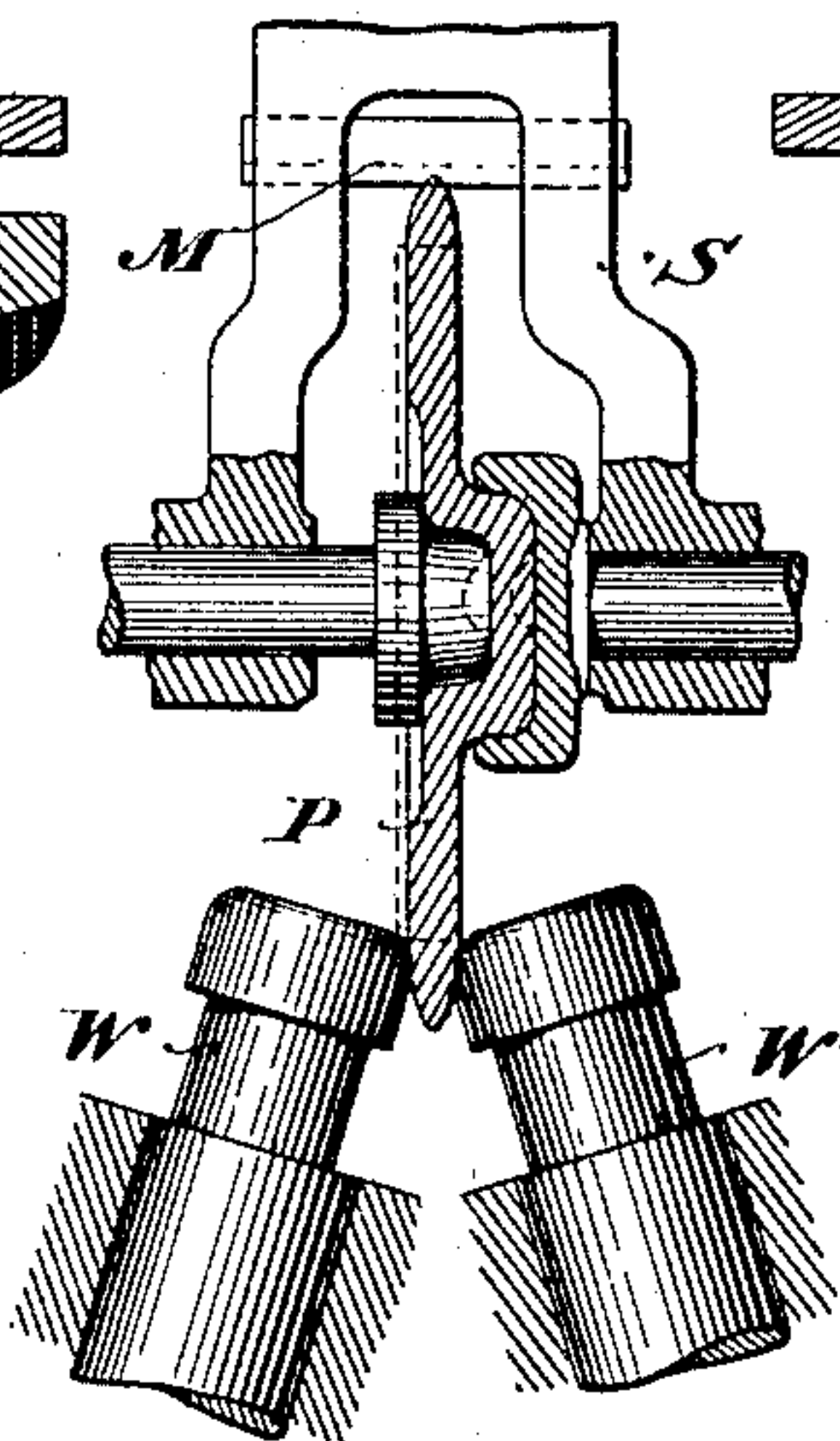


Fig.13.

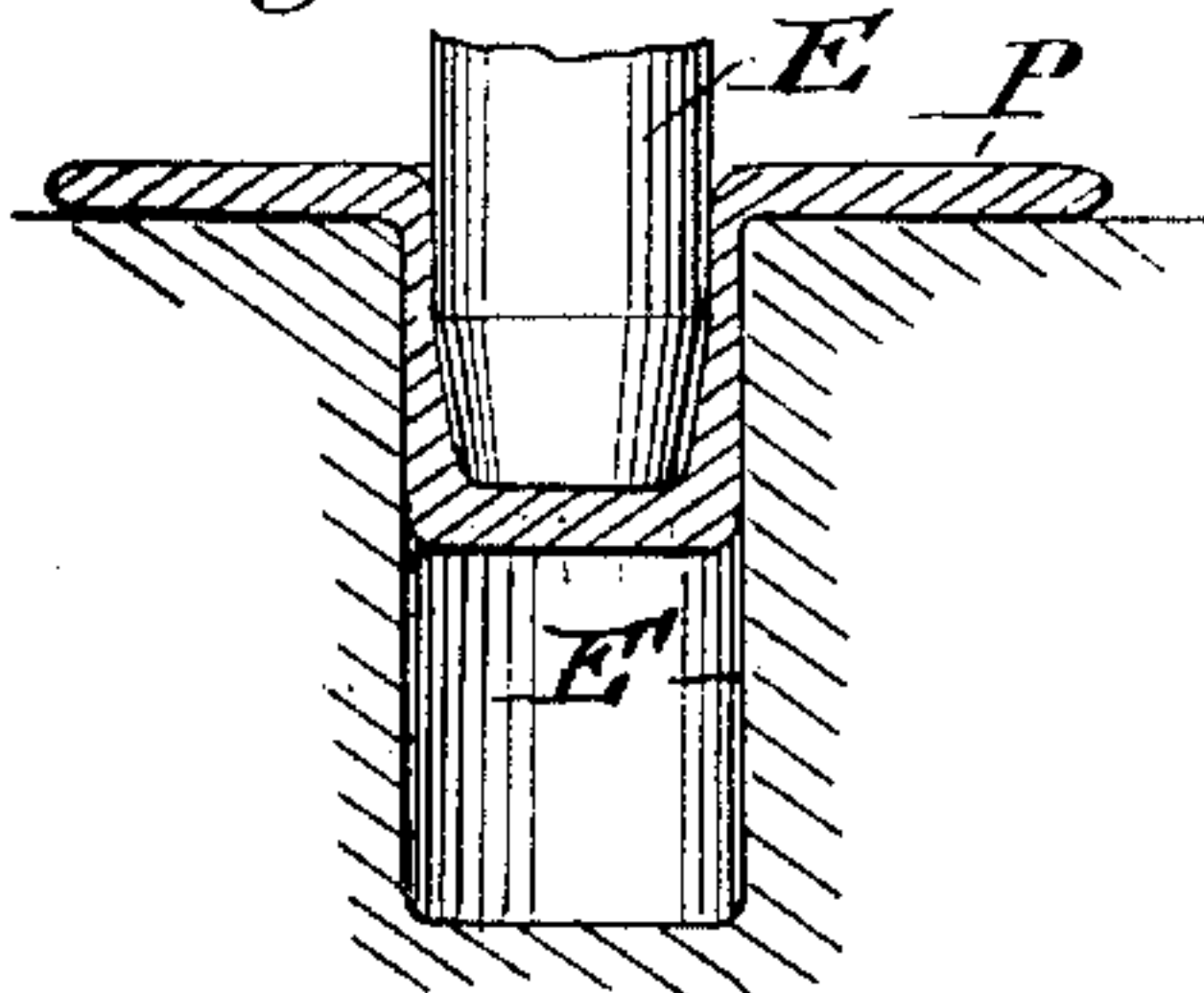
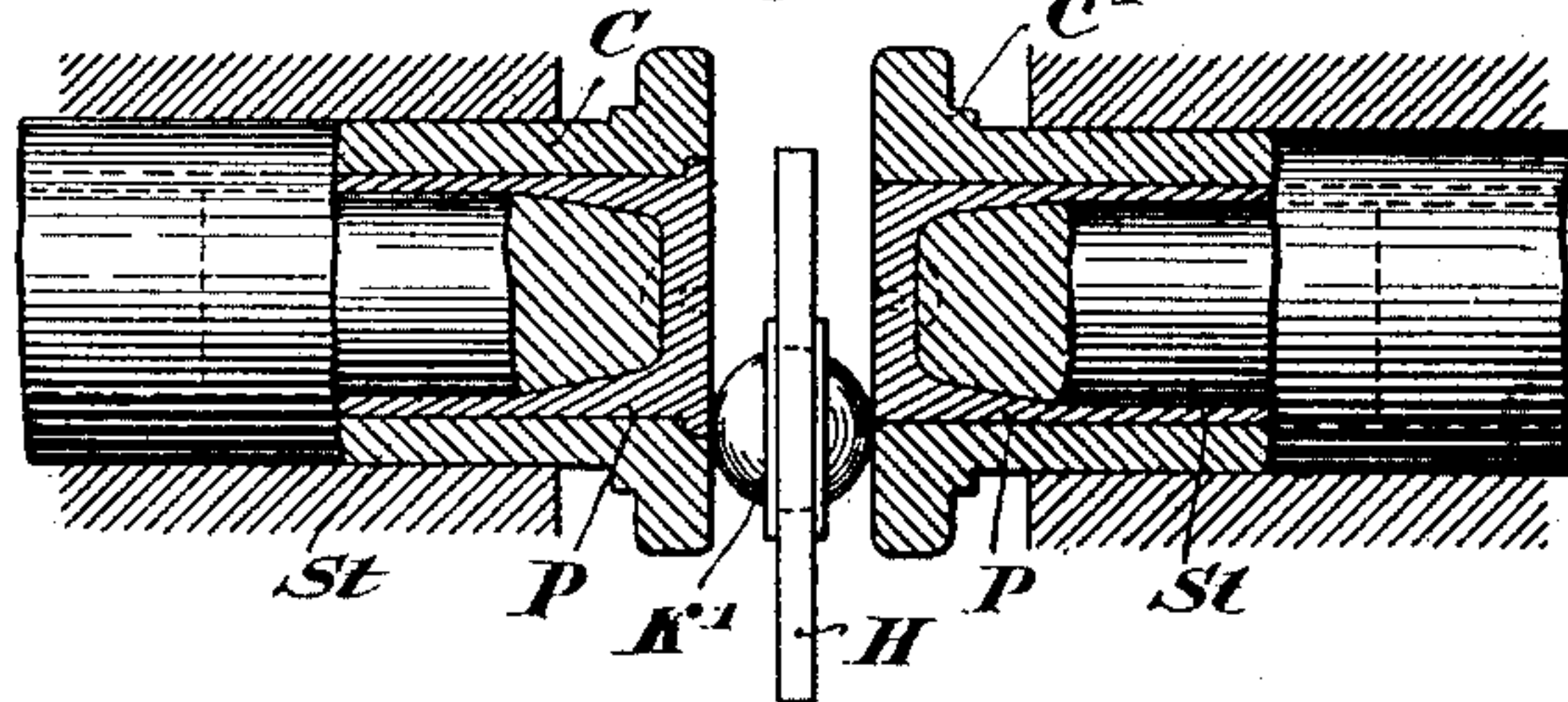


Fig.12.



Fig.11.



Witnesses:

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by *Max Imgen*  
his attorney.



# UNITED STATES PATENT OFFICE.

EUGEN POLTE, OF MAGDEBURG-SUDENBURG, GERMANY.

## METHOD OF MAKING HOLLOW METAL ARTICLES.

SPECIFICATION forming part of Letters Patent No. 756,404, dated April 5, 1904.

Application filed August 20, 1902. Serial No. 120,400. (No model.)

*To all whom it may concern:*

Be it known that I, EUGEN POLTE, manufacturer, a subject of the King of Prussia, German Emperor, residing at Magdeburg-Sudenburg, Kingdom of Prussia, Germany, have invented certain new and useful Improvements in Methods of Making Hollow Metal Articles; 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 invention relates to improvements in methods of forming hollow metal articles from plates or disks, and has for its object the formation of articles possessing uniformity of contour and strength.

In the accompanying drawings I have illustrated the successive steps of the process as carried out by a preferred form of apparatus.

In the drawings, Figures 1 to 7, inclusive, illustrate the progressive transformation of the disk into the completed article. Fig. 8 illustrates the method by which is produced the formation shown in Fig. 3. Fig. 9 illustrates the next step by which the formation shown in Fig. 4 is produced. Fig. 10 illustrates the method of producing the formation shown in Fig. 5. Fig. 11 shows the method of finishing the article. Fig. 12 is an end view of the shearing-knife, and Fig. 13 shows the step of producing the form shown in Fig. 6.

The plate, preferably in the form of a disk P, is provided with a central depression V by means of a punch and die or in any other known manner. This recess may be that illustrated in full lines in Fig. 2 or as shown in dotted lines in said figure. The disk having the central depression is then placed in a suitable apparatus—such, for instance, as that shown in Fig. 8—having one member D stationary and provided with a recess adapted to receive the depression in the disk, thus serving to center the disk and by friction to prevent the rotation of the same. The opposing member F is revoluble and carries upon its face a runway for a series of balls. The axes of the two members D and F correspond, and by rotating the member F under

pressure the balls produce in the disk P an annular groove R concentric of the depression V, resulting in a thickening of the disk at each side of the groove. The disk shown in Fig. 3, resulting from the step just described, is then by means of a punch and die, such as shown in Fig. 9, brought to the formation shown in Fig. 4. It is then transferred to a mechanism, such as that illustrated in Fig. 10. This mechanism consists of a frame S, carrying a two-part rotatable shaft, between the members of which is rigidly held the article. This frame is arranged so as to be capable of displacement toward and away from the rollers W and W', which have a fixed mounting and which rotate in opposite directions. The article having been placed within the frame S and the heads of the rollers W and W' brought to bear under pressure upon the article near the central portion thereof the rollers are set in motion and the article is rolled in a circular direction about its center and gradually approaching its periphery. In this manner the fibers of the metal are caused to lie in a substantially circular direction concentric with the axis of the disk while the article is being spun out to a greater diameter and thinness. The knife-edge M is mounted within the frame and operates to shear off the edge of the constantly-widening rotating disk in such manner as to maintain the same diameter. The importance of having the fibers extend in a substantially circular direction concentric with the plate will be apparent when the article is considered in its finished condition as a shell having the fibers extending in a direction at substantially right angles to its axis and constituting a bond to prevent disruption.

After the completion of the step just described the plate is by means of a drawing-machine E E' or other suitable apparatus transformed into a shell of any desired shape such, for instance, as shown in Fig. 6—whereupon the shell is placed within hollow cylinders C and C', having an inner core St, which forms a support for the inner surface of the shell. The two cylinders C and C' are so disposed that their axes correspond and as to be adjustable longitudinally with reference to each



other. The face of each cylinder has a contour corresponding to the shape desired to be imparted to the shell and serves as a mold into which the material forming the basis of the shell is rolled by means of a ball K', so arranged in a suitable holder or frame H that by manipulating the latter the ball may be guided over the opposing bottoms of the shells. These cylinders C and C' rotate at equal speeds in opposite directions, whereby a rotary movement is imparted to the ball K' by its friction contact with the bottom of the shell carried by the cylinders. This rotary movement of the ball K' and the transverse movement to the same by means of the holder H produce a rolling effect upon the bottoms of the shells, which imparts to the same great firmness of texture as well as the desired shape.

It will be obvious that the successive steps hereinbefore described may be performed in a more or less advantageous manner by means of mechanism differing from that herein described and illustrated, the essence of my invention residing in the particular method described by which the circular disk or plate is transformed into the finished shell without regard to the apparatus by means of which said transformation is effected.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The method of making hollow metal articles, which consists in rolling a disk of metal spirally from the center toward the periphery while maintaining its flatness, and then forming it into the desired shape.

2. The method of making hollow metal articles, which consists in cupping the central portion of a metal plate to form the bottom of the article, rolling the outer portion of the plate spirally from the center toward the periphery while maintaining its shape, and then forming it into the desired shape.

3. The method of making hollow metal articles, which consists in forming an annular groove about the central portion of a metal plate, cupping the plate to form the bottom of the article, rolling the outer portion of the plate by rolling spirally from the center toward the periphery, and then forming into the desired shape.

4. The method of making hollow metal articles, which consists in rolling an annular

groove about the central portion of a metal plate, cupping the plate over an area conforming substantially to the space within the annular groove to form the bottom of the article, rolling the outer portion of the plate spirally from the center toward the periphery, and then forming into the desired shape.

5. The method of making hollow metal articles, which consists in forming in a metal plate a central depression, rolling an annular groove concentric to the depression, cupping the portion embraced by the annular groove to form the bottom of the article, rolling the outer portion of the plate spirally from the center toward the periphery, and then forming into the desired shape.

6. The method of making hollow metal articles, which consists in rolling a metal plate spirally from the center toward the periphery, forming into the desired shape, and then finishing by rolling the bottom of the article.

7. The method of making hollow metal articles, which consists in cupping the central portion of a metal plate to form the bottom of the article, rolling the outer portion of the plate spirally from the center toward the periphery, forming into the desired shape, and finishing by rolling the bottom thereof.

8. The method of making hollow metal articles, which consists in forming by pressure an annular groove about the central portion of a metal plate, cupping the portion embraced by the annular groove to form the bottom of the article, rolling the outer portion of the plate spirally from the center toward the periphery, forming into the desired shape, and finishing by rolling the bottom thereof.

9. The method of making hollow metal articles, which consists in forming in a metal plate a central depression, rolling an annular groove concentric to the depression, cupping the portion embraced within the annular groove to form the bottom of the article, rolling the outer portion of the plate spirally from the center toward the periphery, forming into the desired shape, and finishing by rolling the bottom thereof.

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

EUGEN POLTE.

Witnesses:

WM. EGGELINE,

W. LOUERS.