(No Model.) 2 Sheets—Sheet 1.

S. T. WELLMAN.

METHOD OF DRAWING DISKS OF METAL INTO TUBULAR FORMS.

No. 348,079. Patented Aug. 24, 1886.

Fig. 1.

Fig. 2.

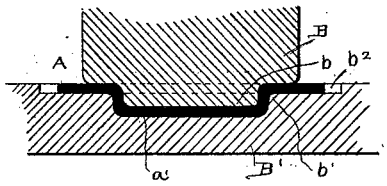


Fig. 3.

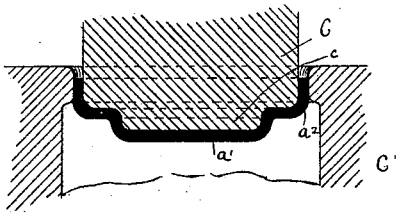


Fig. 4.

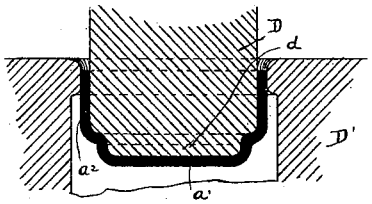


Fig. 5.

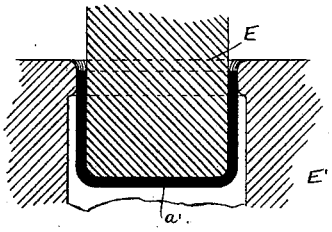
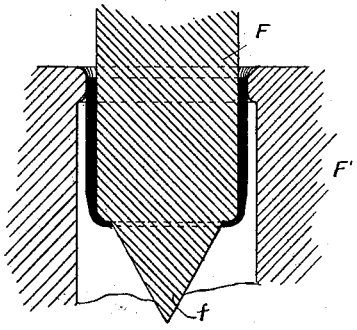


Fig. 6.



WITNESSES

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(No Model.) 2 Sheets—Sheet 2.

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No. 348,079. Patented Aug. 24, 1886.

Fig. 7.

Fig. 8.

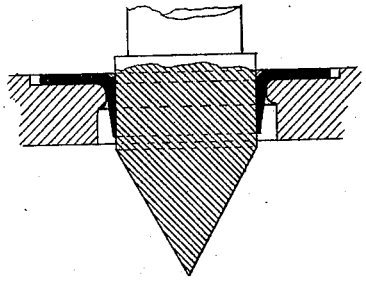


Fig. 9.

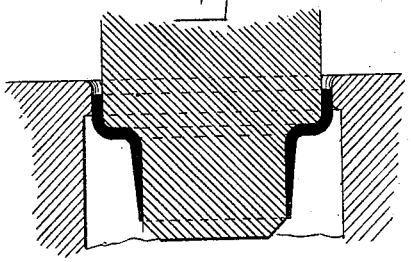


Fig. 10

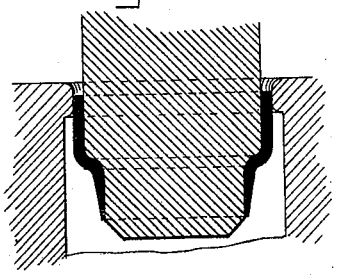
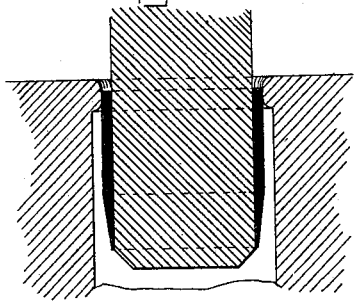


Fig. 11.



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UNITED STATES PATENT OFFICE.

SAMUEL T. WELLMAN, OF CLEVELAND, OHIO.

METHOD OF DRAWING DISKS OF METAL INTO TUBULAR FORMS.

SPECIFICATION forming part of Letters Patent No. 348,079, dated August 24, 1886.

Application filed February 4, 1886. Serial No. 190,823. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL T. WELLMAN, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Processes or Methods of Forming from Metal Disks Blanks for Seamless Tubes or Shells; 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 pertains to make and use the same.

My invention relates to an improved process or method of forming from metal disks blanks for seamless tubes or shells, the improvement consisting, essentially, in first depressing, indenting, or puncturing, as the case may be, the central portion of the disk, and utilizing such depression, indentation, or puncture as a means of holding the blanks centrally in the dies during the subsequent successive stages of drawing and forming the blank. Heretofore with this class of work a metal disk was placed as nearly central as possible over and forced through a die or ring of suitable size, somewhat less in diameter than the disk, a plunger being used for the purpose, by means of which operation the edges of the disk were turned up into a rim substantially at right angles to the plane of the disk. Next, the blank was placed over and forced through a smaller die, a correspondingly-smaller plunger being employed, by which latter operation more metal from the periphery of the disk was forced into the rim, the latter being reduced in diameter, and elongated by passing through the smaller dies. The process was continued by means of a series of dies and plungers successively smaller in diameter until the blank had been brought to the desired diameter, the elongation reached depending on the thickness of the upturned rim and on the amount of metal that was in the initial blank. The difficulty was in holding the blank centrally over the successive dies through which the blank was forced. A slight inaccuracy in placing and holding the blank over a die resulted disastrously. The preponderance of metal on one side would tend to force the plunger more or less toward the opposite side, so that the rim would not be made of uniform thickness. Also, the metal was liable to be strained or torn, and, at best, the result was a rim of variable thickness and an excess of metal on one side that was wasted and had eventually to be sheared off. As a matter of fact, such misplacements of the blanks heretofore have, in a commercial sense, been of ruinous frequency. I have therefore devised, as an improvement, the recessing, depressing, indenting, or puncturing of the initial blank at the center thereof, and by means of suitable and corresponding depending projections on the respective plungers, said projections being adapted to respectively engage such depressions or punctures, as the case may be, such engagements serve to hold the blank in central positions, respectively, over the different dies used in forming and shaping the blank.

In the accompanying drawings, Figure 1 is an edge view of the disk from which the tube is made; and Figs. 2, 3, 4, and 5 are views in section, showing the dies and plungers for converting the disk into a seamless shell. Fig. 6 is a similar view of plunger and die for converting a seamless shell, as shown in Fig. 5, into a seamless tube, or into a shell open at both ends. Fig. 7 is a view of the disk from which the tubes can be formed, and Figs. 8, 9, 10, and 11 show dies and plungers for converting the disk into a tube.

Fig. 1 is an edge view of the initial disk A, from which is to be made a suitable blank for a seamless shell or tube. If a tube open at both ends is to be made, the blank may have a round central hole, *a*, made therein, as shown in Fig. 7.

Fig. 2 is an elevation in section of the plunger B and die B′, the former having a depending disk-like projection, *b*, and the latter having a corresponding depression or recess, *b′*, for forming the cup-like recess or depression *a′* of the blank. The die B′ has a circular shallow recess, b^2, concentric with the depression *b′*, and into which the blank A fits nicely, so that the recess *a′* is necessarily made concentric with the periphery of the disk A. In place of the recess b^2, perhaps guides could be arranged to hold the disk A centrally onto the plunger B; but great care should be taken to make the depression or recess *a′* absolutely concentric with the periphery of the disk A, as the success of the subsequent operations will depend on such accuracy. The blank is next placed between the plunger C and the die C′.

The lower end of the plunger at *c* fits in the depression or recess *a'* and brings the blank in a central position under the die C'. The opening through the die is somewhat smaller than the diameter of the blank, and an upturned rim, a^2, is flanged, that is of uniform thickness.

Fig. 4 is an elevation in section of the plunger D and the die D', the plunger having a part, *d*, to fit the recess *a'*, and the die having a reduced bore, so that more metal is added to the rim a^2, the same being forced from the body of the blank. Any number of these plungers and dies may be arranged, according to the size of the initial disk and the reduction to be made. The last of the series is shown in Fig. 5, where the plunger E is of uniform size and fits the depression *a'*, and the bore of the die E' is of such diameter that the upturned shell is reduced in size, so that internally it corresponds with the internal diameter of the recess or depression *a'*. If a tube or shell open at both ends is desired, a round hole, *a*, is made, either in the initial disk, as shown in Fig. 7, or is made in the center of the blank after leaving the plunger and die E and E'. A plunger, F, and die F' are provided, the body of the plunger being of suitable size to fit the blank, and terminating in a conical lower end, *f*. The bore of the die F' is slightly smaller than that of the die E'. The apex of the cone *f* enters the hole *a*, and spreads or flanges out the central part of the blank, as shown in Fig. 6. This opening or flanging out of the central part of the disk may be done in the first instance, as illustrated in Fig. 8.

The successive steps illustrated in Figs. 9, 10, and 11 are substantially the same as shown in Figs. 3, 4, and 5, except that in place of a depression or recess, *a'*, the large opening made in the center of the disk, as shown in Fig. 8, is utilized for holding the disk centrally between the successive dies and plungers, the lower end of each plunger being made to fit such opening, as shown.

What I claim is—

1. The method of forming from metal disks blanks for seamless tubes or shells, consisting in first forming a depression or puncture in the disk concentric with the periphery thereof, the said depression or puncture being of a diameter equal to the diameter of the shell to be formed therefrom, and then forcing the blank through dies for the purpose of reducing the same, substantially as set forth.

2. The combination, with a die and plunger constructed to form a depression or puncture in a blank concentric with the periphery thereof, of one or more sets of dies for reducing the blank, and a plunger for each die, each of said plungers having a projection adapted to fit within the depression or puncture formed by the first-mentioned plunger, substantially as set forth.

In testimony whereof I sign this specification, in the presence of two witnesses, this 26th day of January, 1886.

SAMUEL T. WELLMAN.

Witnesses:
CHAS. H. DORER,
GEO. W. KING.