3 Sheets—Sheet 1.

F. HOELTGE.

MANUFACTURE OF SHEET-METAL ELBOWS.

No. 194,911. Patented Sept. 4, 1877.

Fig. 1.

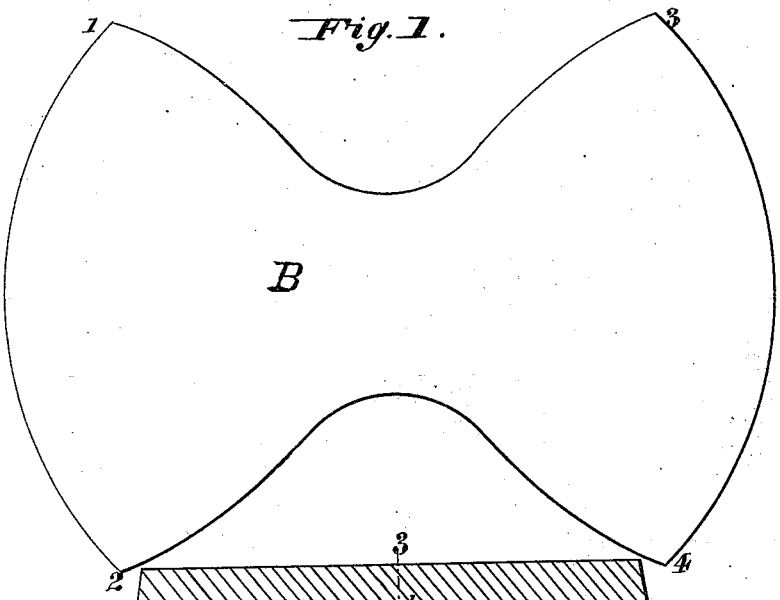


Fig. 2.

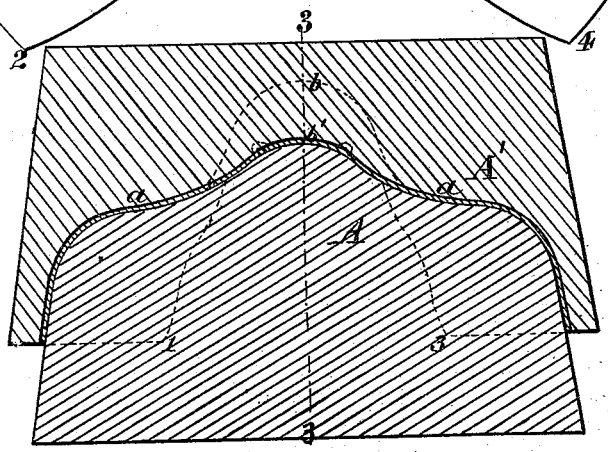
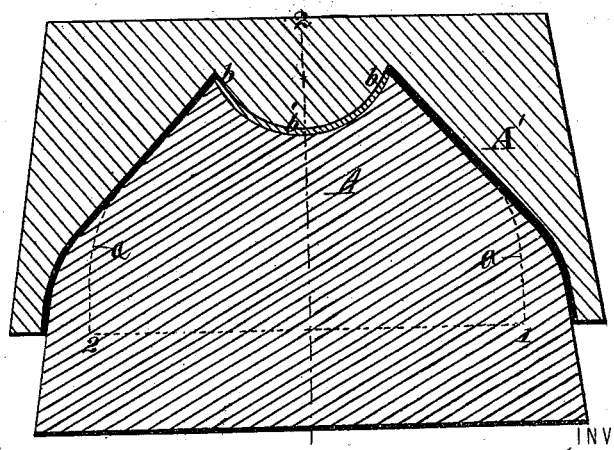


Fig. 3.



WITNESSES
Chas J. Gooch
LeBlond Burdett

INVENTOR
F. Hoeltge
By Knight Bros Attorneys

3 Sheets—Sheet 2.

F. HOELTGE.

MANUFACTURE OF SHEET-METAL ELBOWS.

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Fig. 4.

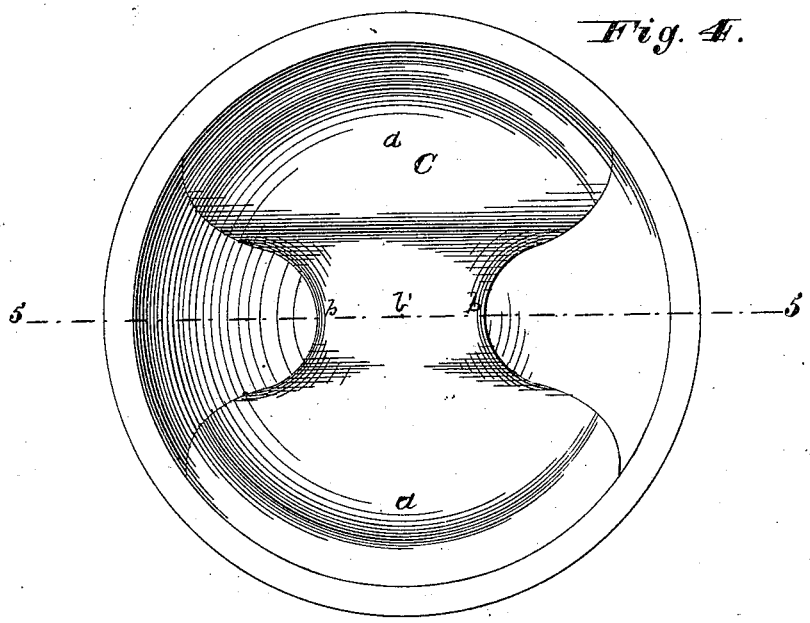


Fig. 5.

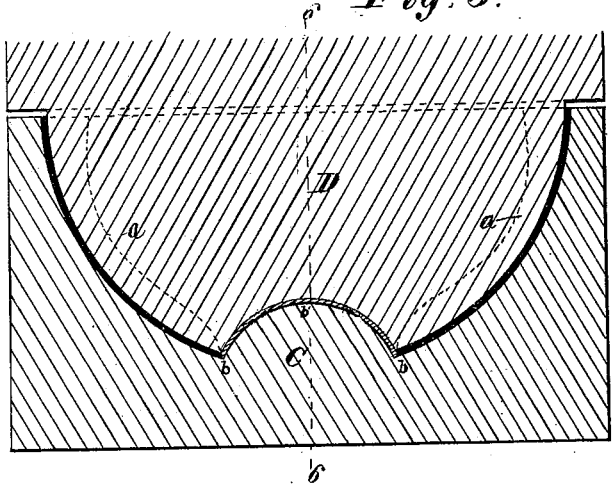
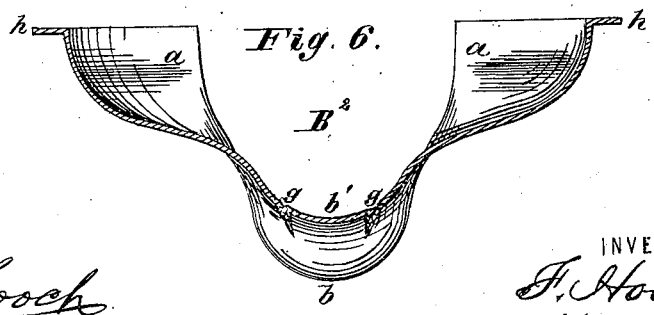


Fig. 6.



WITNESSES

Chas. E. Gooch

Le Blond & Burdett.

INVENTOR

F. Hoeltge

By Knight Bros. Attorneys

3 Sheets—Sheet 3.

F. HOELTGE.

MANUFACTURE OF SHEET-METAL ELBOWS.

No. 194,911. Patented Sept. 4, 1877.

Fig. 7.

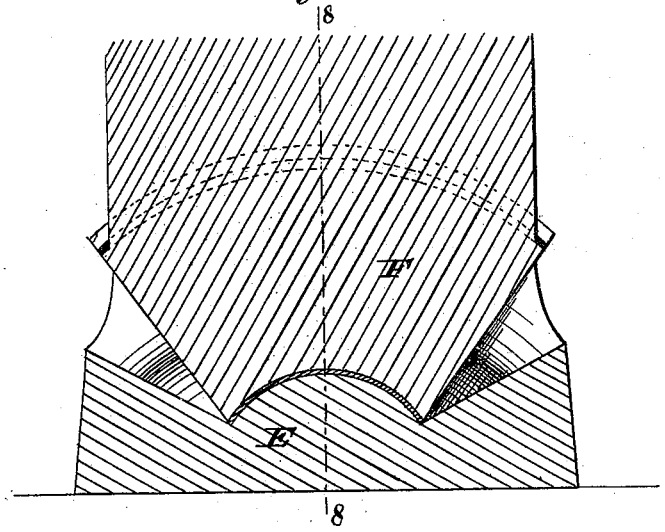


Fig. 8.

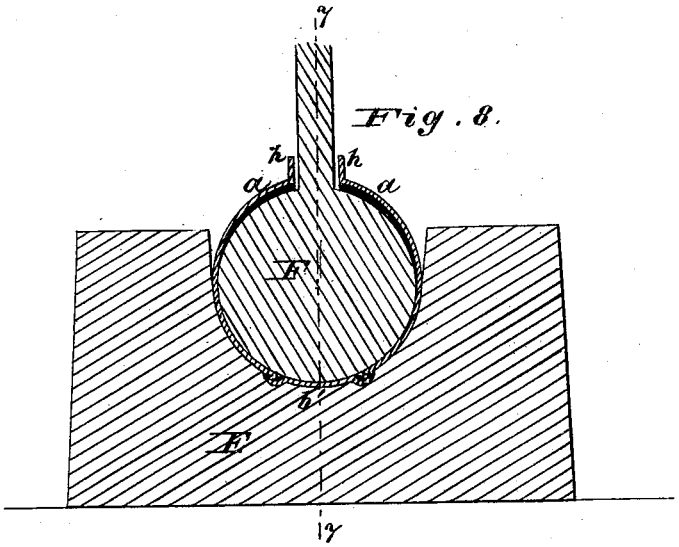
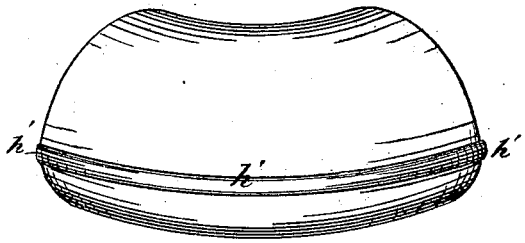


Fig. 9.



WITNESSES

Chas. J. Cook

L. Blond Burdett.

INVENTOR

F. Hoeltge

By Knights Bros. Attorneys

UNITED STATES PATENT OFFICE.

FREDERICK HOELTGE, OF CINCINNATI, OHIO, ASSIGNOR TO HIMSELF, WILLIAM SELLEW, AND WILLIAM S. MUNSON, OF SAME PLACE.

IMPROVEMENT IN MANUFACTURE OF SHEET-METAL ELBOWS.

Specification forming part of Letters Patent No. 194,911, dated September 4, 1877; application filed May 22, 1877.

To all whom it may concern:

Be it known that I, FREDERICK HOELTGE, of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Sheet-Metal Elbows, and in processes and appliances for making the same, of which the following is a specification:

My invention relates to a blank of approximately hour-glass shape with convex ends, the ends being of suitable width to be swaged with lateral curvature to form the outer bend of the desired elbow, and the contracted central portion of suitable width to be swaged with a curvature to form the inner bend of the said elbow, as hereinafter described.

The invention further consists in a process of forming sheet-metal elbows by swaging transverse curves, in the manner hereinafter described, in the center part and in the ends by an hour-glass-shaped blank, and bringing the ends together so that the end curvatures will form the outer bend of an elbow, and the central curvatures will form the inner bend.

The invention further relates to a novel construction of dies for swaging and bending my improved blank into the required elbow shape.

In the accompanying drawings, Figure 1 is a plan of the improved blank. Fig. 2 is a vertical section of the first pair of dies on the line 2 2, Fig. 3. Fig. 3 is a vertical section of the same in a plane at right angles to the other on the line 3 3, Fig. 2. Fig. 4 is a plan of the female die C used in the next operation. Fig. 5 is a section of the second pair of dies on the line 5 5, Fig. 4. Fig. 6 is a transverse section of the blank as it leaves the dies C D. Fig. 7 is a longitudinal section of the last pair of dies on the line 7 7, Fig. 8, with a swaged blank between them. Fig. 8 is a transverse section of the same at 8 8, Fig. 7. Fig. 9 is a perspective view of the finished elbow.

The blank B being cut to the required shape, as shown in Fig. 1, is placed on the first die, A, Fig. 2, and an upper female die, A′, of corresponding form, being placed above it, the blank is stamped to the surface of said die A. This may be effected by a single blow in a drop-press, or it may be done by screw, cam, or other pressure, as preferred. The die A is made with a margin of nearly spherical convexity at *a a*, and with a central ridge rising to great prominence at the extremities *b b*, and curving downward at the central part *b′*, between said extremities, the lowest part *b′* of the ridge being higher than the marginal shoulders *a a*. The shape imparted to the blank is shown by the dotted outline in Figs. 2 and 3, and by the cutting-section.

It will be understood that the narrow central part of the blank B is laid over the curved ridge *b b′ b*, so that when the first stamping is completed the transverse curvature extending from *b* to *b* approximates to that required for the inner curve of the elbow, while the convex shape imparted by the shoulders *a a* to the metal extending from 1 to 2 and from 3 to 4 approximates to that required for the outer curve or back of the elbow when the extremities of the blank are brought together, as hereinafter explained.

In the swaging operation the metal may be stretched so as to produce the central curvature required; but I prefer to leave it free to buckle slightly, as shown at *g g* in Fig. 6, which causes slight folds or corrugations in the metal. These appear on the inner side of the finished elbow, and are not unsightly. By permitting this slight buckling of the metal it is saved from severe strain.

The blank B produced by the first dies A A′ is placed in inverted position within the female die C, (shown in Fig. 4,) and a corresponding male die, D, Fig. 5, is placed in it and pressed by a drop or other means. Fig. 6 indicates the shape of the blank B^2 at this stage by section in a plane at right angles to that given in Fig. 5, the central part of the blank being cut by the section in the last-named figure, and the margin of one-half of it being represented in dotted lines as within or between the dies. The heavy dark lines in Figs. 3 and 5 represent a space between the dies where no metal exists. Fig. 6 shows the blank B^2 as it leaves the dies C D, the plane of section being on the line 6 6, Fig. 5. The plane of section in Fig. 6 is the same as in Figs. 1 and 2, but the blank is shown in inverted position.

The blank B^2, shaped as shown in Fig. 6, is next placed in the die E, Figs. 8 and 9, and a male die, F, of the shape shown in same figures,

being placed over it and forced down, the pressure causes the ends of the prepared blank to approach each other, bringing the curves or shoulders *a a*, which now form the back of the elbow, into positions concentric, or nearly so, with the inner curve *b b'*. The die F being now slipped out endwise, the lips *h h*, which may be formed in the second stamping operation by the dies C D, are united in a seam, *h'*, extending along the outer bend of the elbow, as shown in Fig. 9.

This mode of forming the longitudinal seam on the outer curve enables me to produce a symmetrical elbow with less strain to the metal than where the convexity to form the outer curve is produced at the center of the sheet.

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

1. The process herein described of forming sheet-metal elbows by swaging in the contracted central part of an hour-glass-shaped blank, a transverse concavity to correspond with the inner curve of the finished elbow, and by swaging in the ends of the said blank transverse convexities, and by bringing the said ends together so that their transverse convexities will correspond with or form the outer curve or back of the elbow.

2. The blank formed, as herein shown, with convex ends of suitable width to be swaged to a curvature corresponding with the outer curve of the desired elbow, and with a contracted center of suitable width for swaging to form the inner curve thereof.

3. The dies A A' and C D, formed with a central curvature, *b b' b*, to impart the necessary shape to the center of the blank to form the inner curve of the elbow, and with marginal shoulders *a a*, to curve the ends of the blank, as and for the purposes set forth.

FREDERICK HOELTGE.

Witnesses:

OCTAVIUS KNIGHT,

LE BLOND BURDETT.