Oct. 7, 1930. H. G. CARLSON 1,777,351

DIES AND METHOD FOR CLOSING PRESSED METAL PIPE FITTINGS

Filed Feb. 9, 1929 2 Sheets-Sheet 1

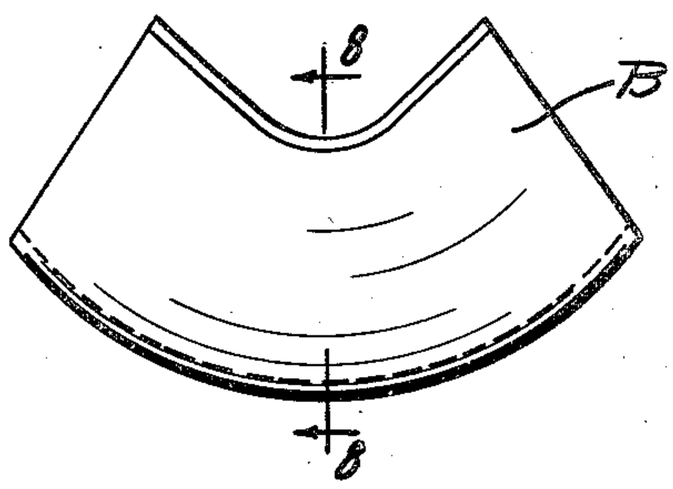

Fig. 7.

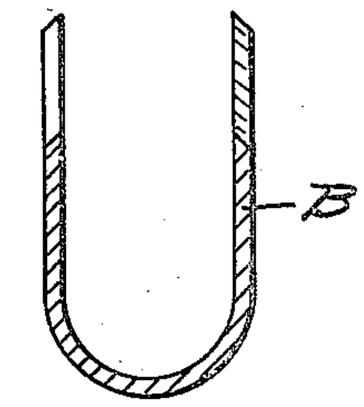

Fig. 8

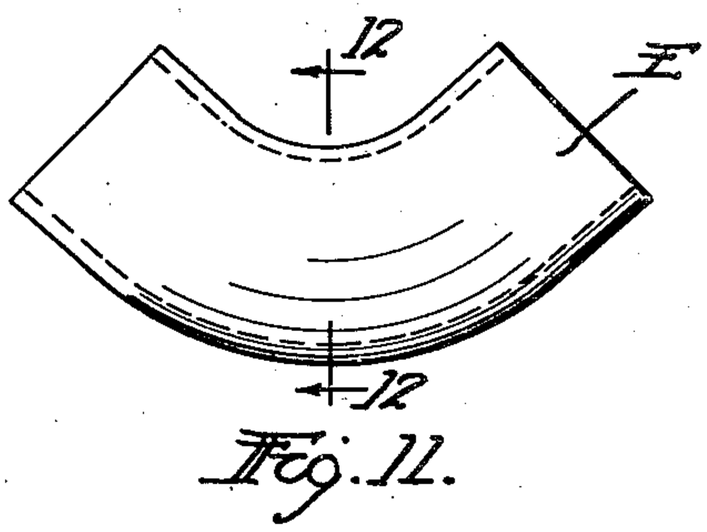

Fig. 11.

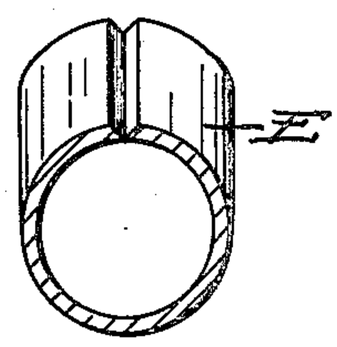

Fig. 12.

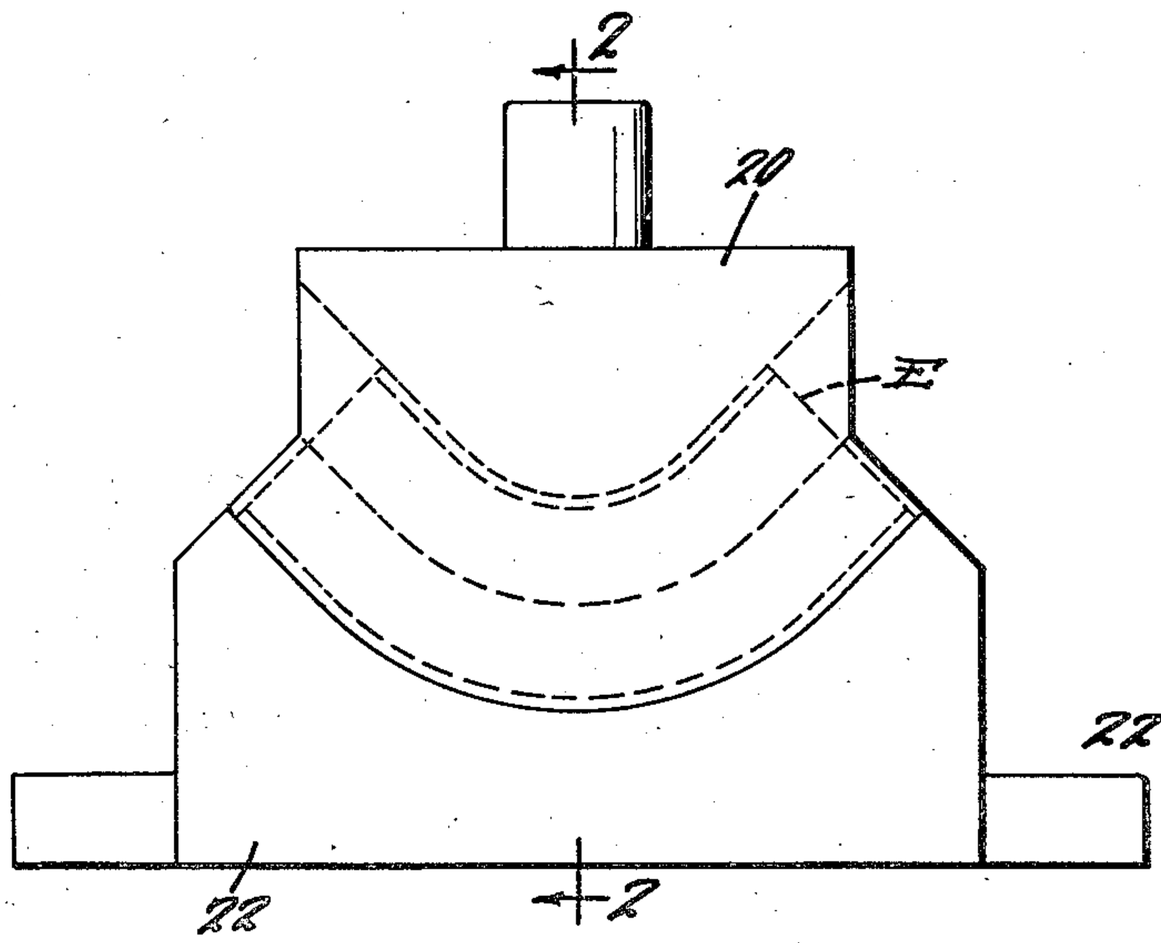

Fig. 1.

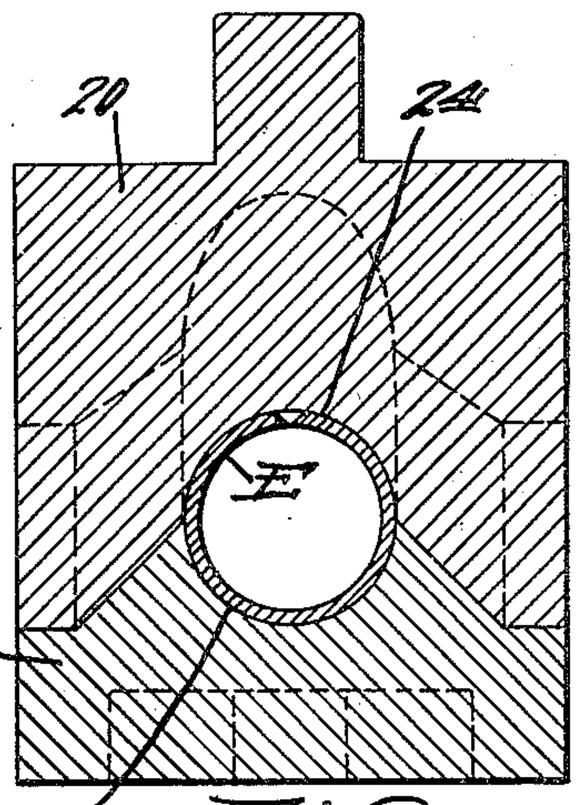

Fig. 2.

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DIES AND METHOD FOR CLOSING PRESSED METAL PIPE FITTINGS

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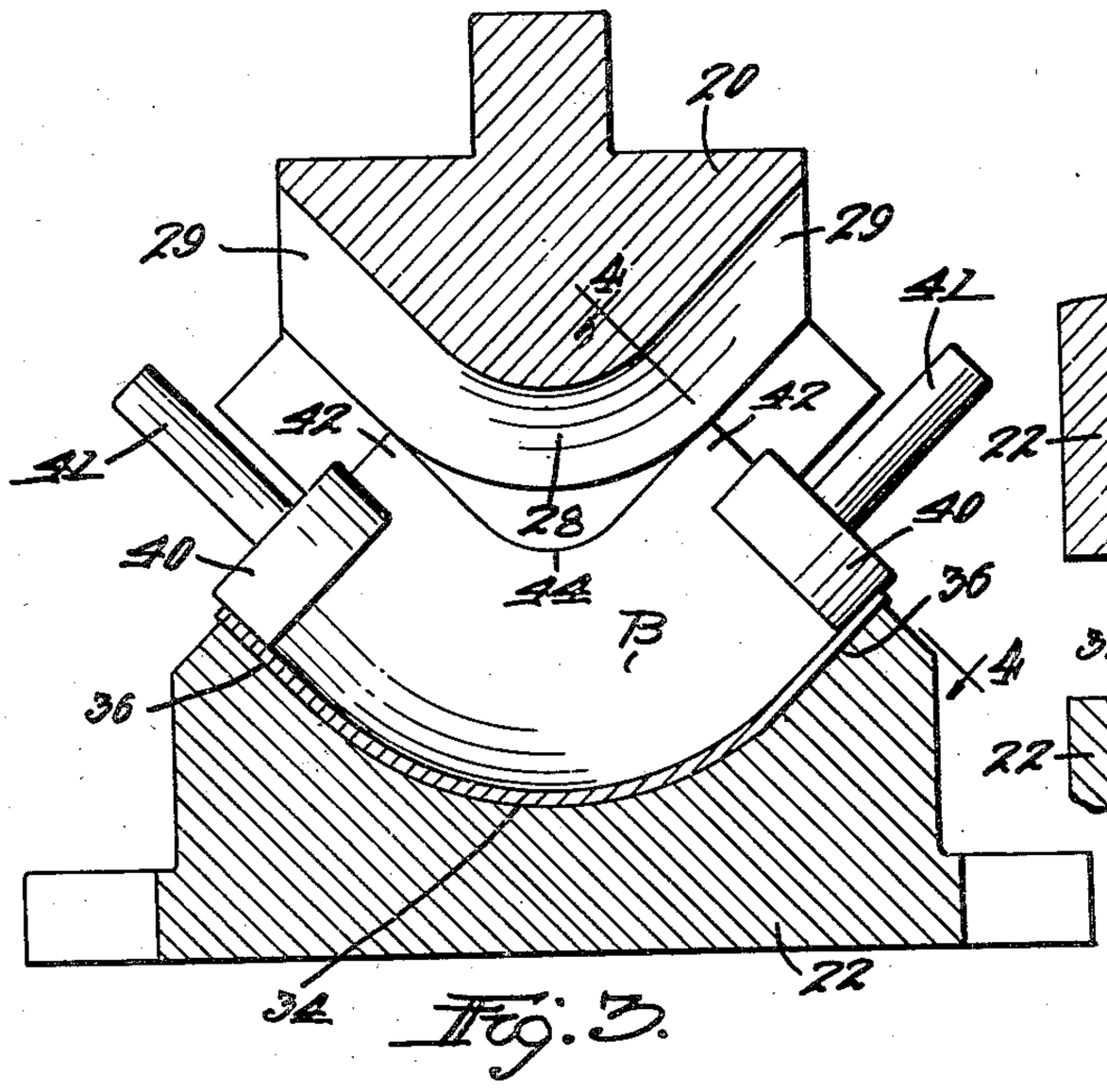

Fig. 3.

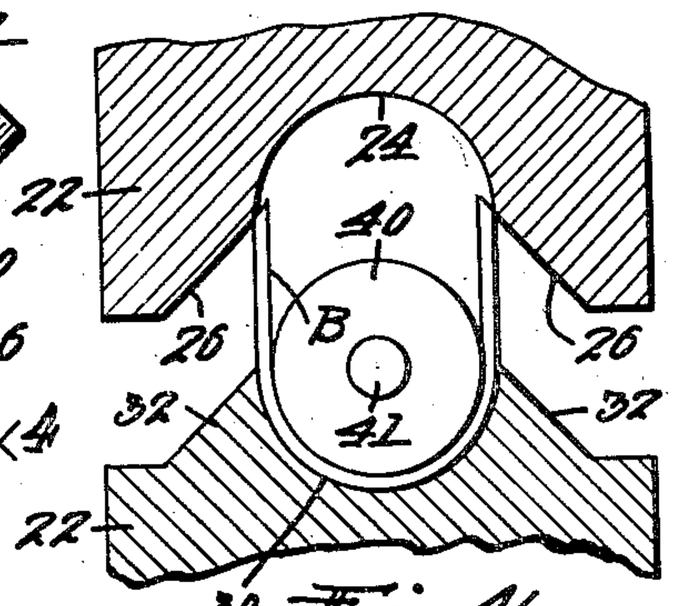

Fig. 4.

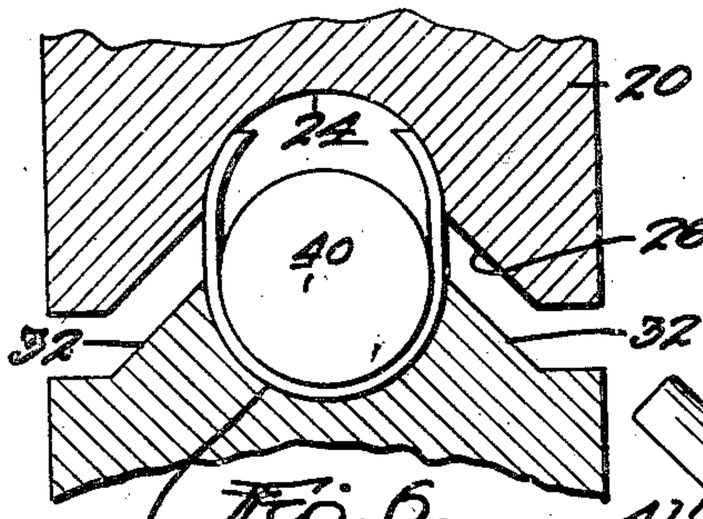

Fig. 6.

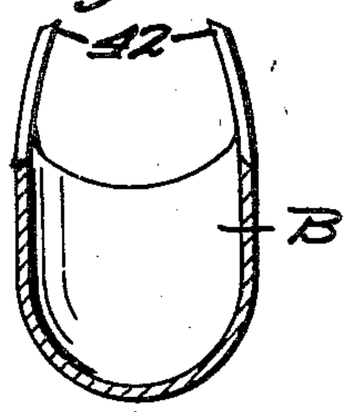

Fig. 10

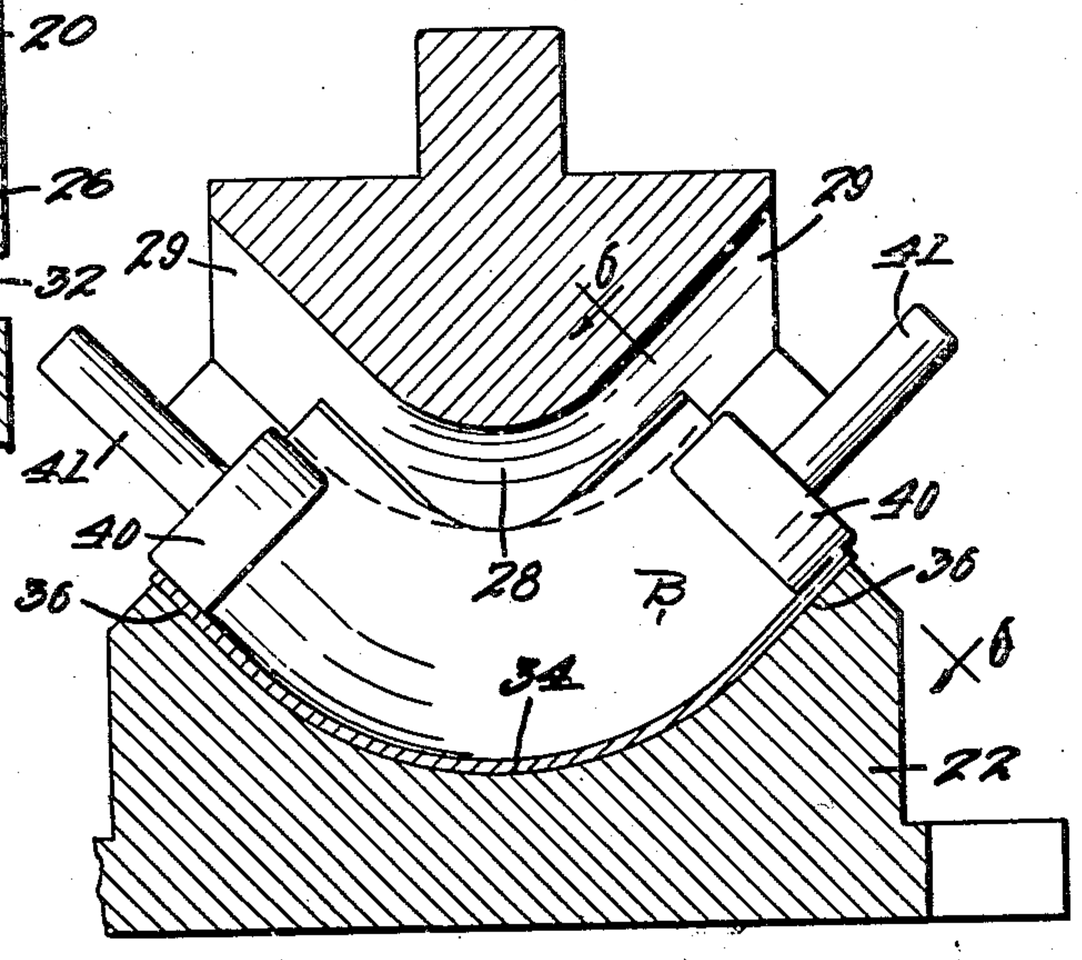

Fig. 5.

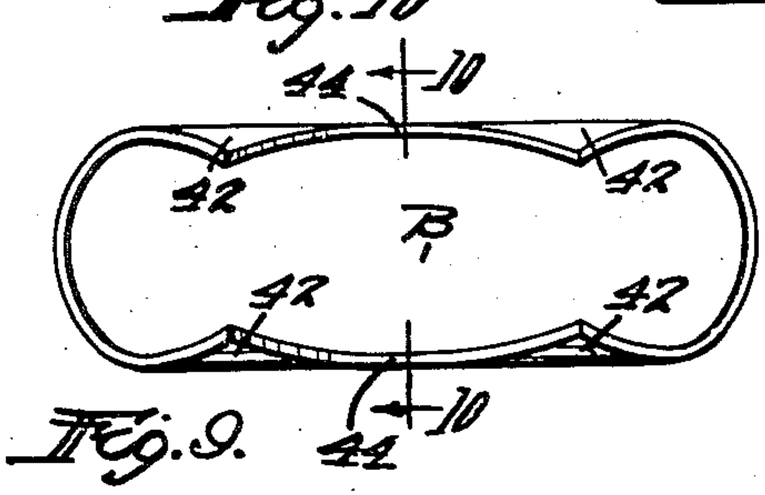

Fig. 9.

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UNITED STATES PATENT OFFICE

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DIES AND METHOD FOR CLOSING PRESSED-METAL-PIPE FITTINGS

Application filed February 9, 1929. Serial No. 338,842.

This invention relates to the manufacture of pressed metal pipe fittings, such as steel elbows, and relates particularly to the construction and method of operation of dies for closing such a fitting or elbow to the desired shape of the finished article.

It is one object of my invention to provide novel and improved dies for such purposes, so designed and constructed that the closing operation may be effectively performed and that the desired shape of the finished article may be accurately attained.

A further object of my invention is to provide an improved method of closing a pressed metal fitting or elbow, by which method the desired final contour is most effectively attained.

My invention further relates to arrangements and combinations of parts which will be hereinafter described and more particularly pointed out in the appended claims.

A preferred construction of my improved dies and the preferred method of operation thereof are illustrated in the drawings in which

Fig. 1 is a side elevation of my improved dies in closed position;

Fig. 2 is a transverse sectional elevation thereof, taken along the line 2—2 in Fig. 1;

Fig. 3 is a longitudinal sectional elevation of the dies in the open position which they occupy at the beginning of an operative movement thereof;

Fig. 4 is a transverse sectional view, taken along the line 4—4 in Fig. 3;

Fig. 5 is a sectional view similar to Fig. 3, but showing the dies partially closed;

Fig. 6 is a detail sectional view, similar to Fig. 4, and taken along the line 6—6 in Fig. 5;

Fig. 7 is a side elevation of the U-shaped blank from which the finished elbow is formed;

Fig. 8 is a transverse section thereof; taken along the line 8—8 in Fig. 7;

Fig. 9 is a plan view of the blank when partially closed as indicated in Figs. 5 and 6;

Fig. 10 is a transverse sectional elevation of the blank, taken along the line 10—10 in Fig. 9;

Fig. 11 is a side elevation of the finished elbow, and

Fig. 12 is a transverse sectional elevation thereof, taken along the line 12—12 in Fig. 11.

Referring to the drawings, my improved dies are designed to act upon a partially formed fitting or elbow having the general form of the U-shaped blank B indicated in Figs. 7 and 8, with the curved outer or convex portion substantially conforming to the outline of the finished elbow, and with the side portions extending upward in substantially parallel relation and having their upper edges trimmed to a predetermined outline and preferably beveled outwardly, as indicated in Fig. 8.

My improved dies are designed to transform the partially formed elbow or blank B indicated in Figs. 7 and 8 to the finished elbow E indicated in Figs. 11 and 12, with the beveled upper edge portions bent inward to abutting relation and thus providing a V-shaped depression at the line of contact of the edges, which depression is later filled with molten metal to form an exceptionally strong joint.

For closing the elbow, I have provided an upper die 20 and a lower die 22. In transverse section, the upper die presents a concave operative portion 24 (Fig. 4) and outwardly and downwardly beveled edge portions 26. In longitudinal section, the die 20 is shown to be rounded or convex at its lowest portion 28 and preferably substantially straight and tangential at its outer end portions 29, said end portions being extended a substantial distance beyond the middle convex portion 28.

Similarly, the lower die 22 shows in cross section a concave middle portion 30 and outwardly and downwardly beveled side portions 32.

In the longitudinal section, the central portion of the die is concave. as indicated at 34, said concave portion merging into substantially straight or tangential portions 36 at each end of the die.

It thus appears that the operative or forming portion of the upper die is concave transversely but convex longitudinally, while the

corresponding portion of the lower die is concave both transversely and longitudinally.

When using my improved dies, I place the U-shaped blank B in the lower die, as indicated in Figs. 3 and 4. It will be noted that the outer curved portion of the blank B, is so formed that it fits accurately in the die 22. I then cause cylindrical plugs 40 to be placed at the two outer ends of the blank B. These plugs are provided with handles 41 and are commonly held in position by the operator.

It will be noted that the upper edges of the blank B are more sharply curved than the engaging portions of the upper die 20, as a result of which the die 20 engages the extreme end portions 42 of the blank before it engages the middle portion 44, and the engagement is thereafter progressive toward the longitudinal center of the blank.

As a result of this progressive engagement, the end portions 42 are bent inward, as indicated in Figs. 5, 6, 10 and 11, before the middle portion 44 is displaced from its upright position. The closing movement is thereafter progressive from the ends toward the center.

The locus of movement of the end portions is determined by the plugs 40, which constrain the end portions to conform to a true circular section. It is found by actual test that when the end portions are thus bent to true circular section in advance of the bending of the middle portions of the blank, the middle portions will follow the curvature established by the end portions and will themselves conform to a true circular section, without the necessity of providing plugs or formers except at the two ends of the blank.

This progressive closing action of the dies from the ends toward the center is very pronounced and is an extremely important part of my invention, as otherwise the middle portion of the elbow would be distorted before the plugs in the end portions had established a true circular section.

In Figs. 1 and 2, the dies are shown in close contact, with the blank B entirely closed and forming a finished elbow E.

The downwardly beveled side portions 26 of the upper die are useful in centering the blank B and in bending the upper edges of the blank inward, if the blank is of slightly greater width than the concave portion 24 of the upper die. The inclined portions 32 of the lower die perform no direct function in guiding or bending the blank, but are cut away partly for clearance and partly to form guides for the upper die. When the dies approach their extreme closed position, as indicated in Fig. 2, the inclined portions 26 of the upper die engage the inclined portions 32 of the lower die and are guided transversely to center the upper die 20 over the lower die 22.

While I have described my invention as particularly adapted to the closing of sheet metal elbows, certain features of the invention are capable of more general application.

Having thus described my invention and the advantages thereof, I do not wish to be limited to the details herein described, otherwise than as set forth in the claims, but what I claim is:—

1. Dies for closing blanks for pressed metal articles comprising a first die having a blank-engaging portion concave transversely and substantially convex longitudinally, and a second die substantially concave both transversely and longitudinally, said first die having guiding portions extending along each side of said curved portion and inclined outwardly therefrom.

2. Dies for closing blanks for pressed metal articles comprising a first die having a blank-engaging portion concave transversely and substantially convex longitudinally, and a second die substantially concave both transversely and longitudinally, said first die having guiding portions extending along each side of said curved portion and inclined outwardly therefrom, said second die having correspondingly inclined portions cut away at both sides of its curved portion.

3. The method of closing a pressed metal elbow which consists in providing a blank U-shaped in cross section engaging the extreme end portions of the sides of said blank first, bending said end portions toward each other to predetermined sections, engaging the intermediate portions of the sides of said blank progressively toward the middle of said blank, and bending said intermediate portions inward to the sections established by said end portions.

4. The method of closing a pressed metal elbow which consists in providing a blank U-shaped in cross section, positioning circular plugs at the ends of said blank, causing dies to close the ends of said blank about said plugs, and progressively closing the intermediate portions of said elbow, working from the ends toward the longitudinal center of said blank.

In testimony whereof I have hereunto affixed my signature.

HJALMAR G. CARLSON.