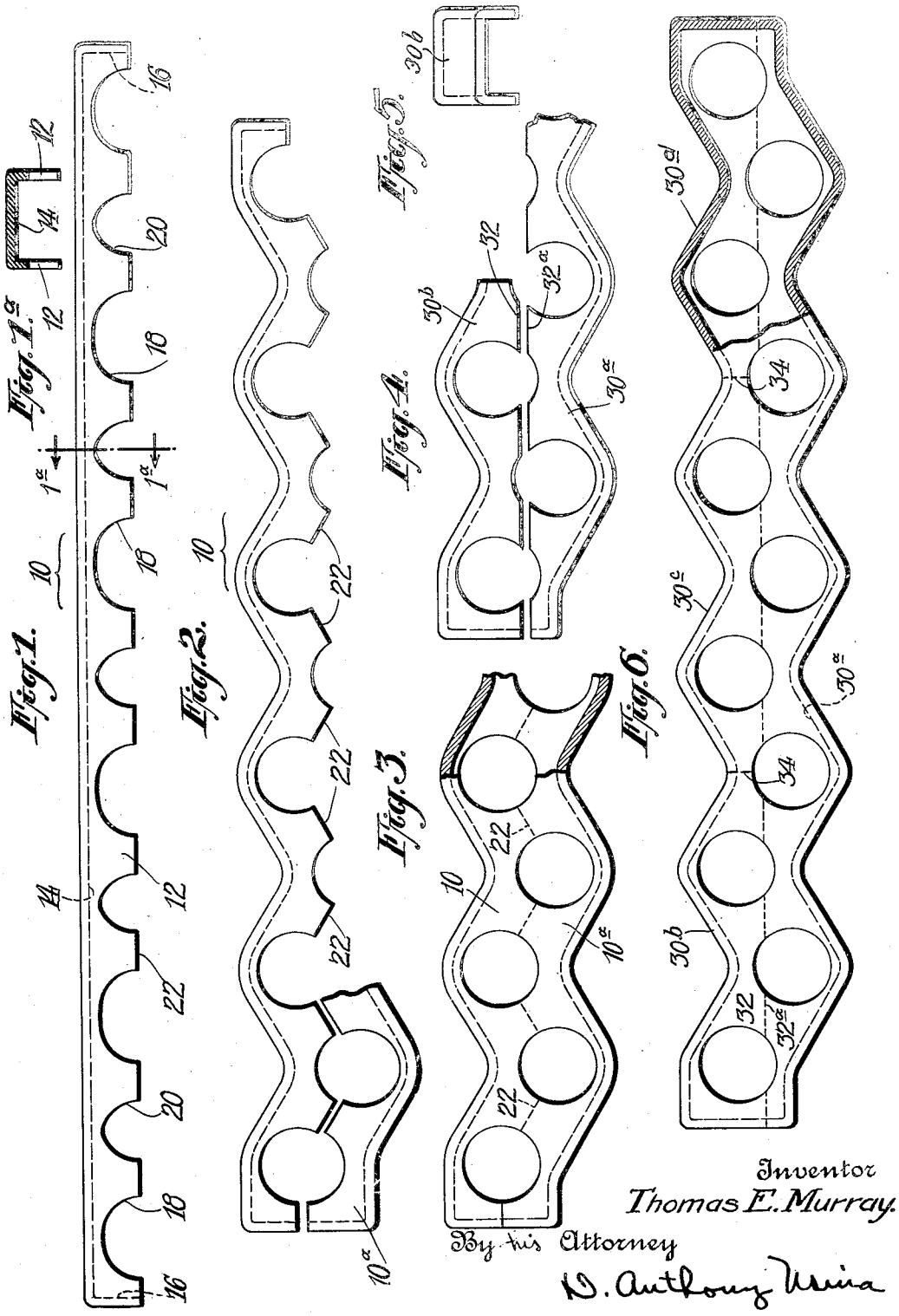
Sept. 24, 1929. T. E. MURRAY 1,729,180

HOLLOW ARTICLE AND METHOD OF MAKING THE SAME

Filed April 20, 1923 2 Sheets-Sheet 1



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HOLLOW ARTICLE AND METHOD OF MAKING THE SAME

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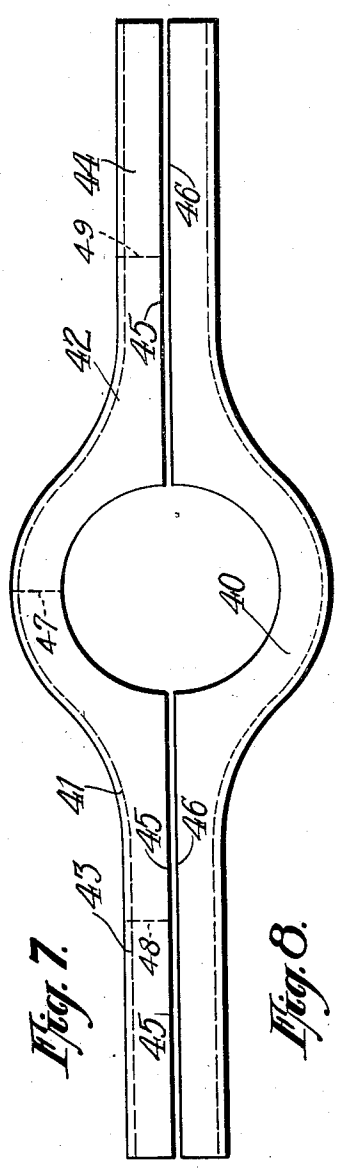


Fig. 7.

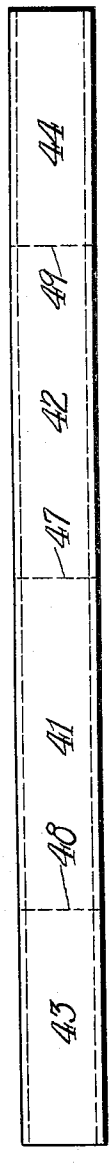


Fig. 8.

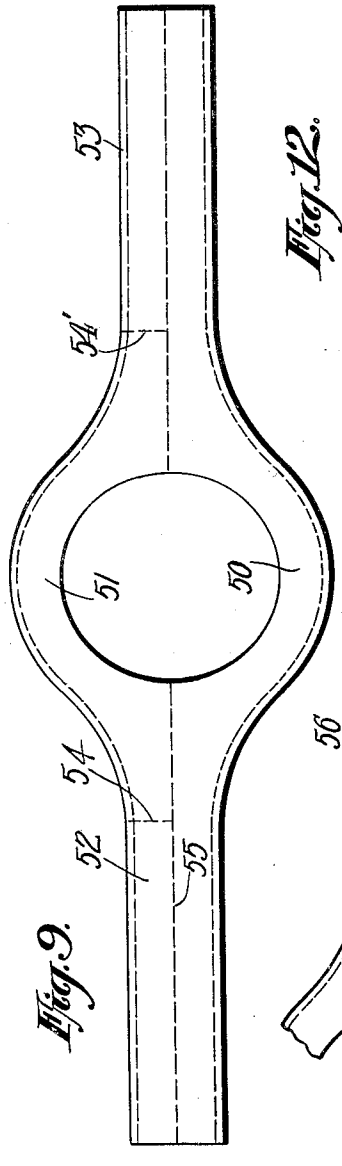


Fig. 9.

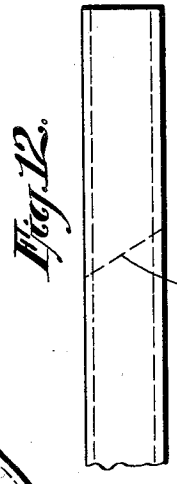


Fig. 12.

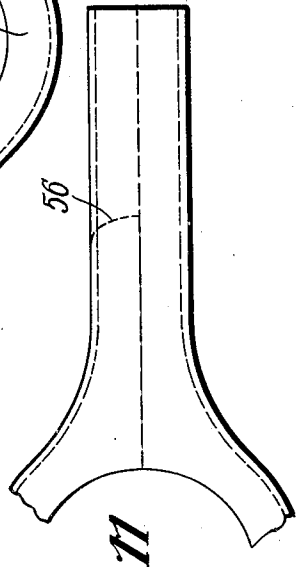


Fig. 11

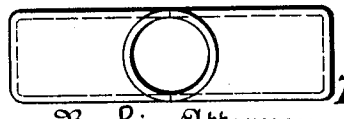


Fig. 10.

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UNITED STATES PATENT OFFICE

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HOLLOW ARTICLE AND METHOD OF MAKING THE SAME

Application filed April 20, 1923. Serial No. 633,407.

This invention relates to improvements in hollow articles and to the method of making boiler headers, axle housings and similar hollow articles.

The invention is illustrated in the accompanying drawings in which

Fig. 1 shows a step in making a boiler header;

Fig. 1ª is a transverse section on line 1ª—1ª of Fig. 1;

Fig. 2 illustrates a further step and Fig. 3 shows one end of a boiler header embodying my invention and made according to my improved method;

Fig. 4 illustrates an alternative step of making a boiler header according to my method;

Fig. 5 is an end view of one of the pieces shown in Fig. 4;

Fig. 6 is a side elevation partly in section showing a header embodying my invention and made according to my method;

Fig. 7 illustrates a step in making an axle housing according to my method;

Figs. 8, 9 and 10 are a plan, side elevation and end view respectively of such axle housing;

Figs. 11 and 12 are a fragmentary view of slightly modified form of axle housing and a plan thereof.

Referring first to Figs. 1 to 3, Fig. 1 shows an elongated member 10 substantially U-shaped in cross-section comprising side walls or flanges 12—12 which are connected by a wall or web 14. At the ends the wall 14 is carried around to form end walls 16. The section 10 can be either a forging or it can be pressed up or stamped from a single sheet of suitable metal. The side walls 12 of the member 10 are punched or otherwise cut away as at 18 and 20 to form part of the apertures for the reception of the boiler tubes. The openings 18 and 20 are of such size and shape that after the member is bent to the desired contour these openings will form portions of a substantially true circle. After the openings 18 and 20 have been formed the member 10 is subjected to pressure in a suitable die and is given the zig-zag or sinuous form illustrated in Fig. 2.

The header is completed by a complementary piece 10ª (Fig. 2) united to the part 10 along the staggered abutting edges 22 (Fig. 3).

The edges of the parts are united preferably by butt welding. For such a long article as an ordinary boiler header the quantity of current required for such a butt weld is enormous and far beyond the capacity of most welding equipments. I propose, therefore, to adapt the process to plants of smaller capacity. This I do by making one of the halves of the header in a number of short pieces of proper cross-section. These are then welded to the continuous integral segment constituting the other half of the article. Each of these partial segments can be welded to the complete segment by means of an equipment of a capacity depending on the length of the partial segment. If three pieces are used to make up one of the halves of the header, the three pieces being of equal length, they can be welded in succession to the opposite continuous half with a capacity only one-third of that required for welding two continuous integral segments, each of the full length of the header. This division of one of the segments into a plurality of parts is shown more fully in connection with Figs. 4 and 6. Here, the segment 30ª is integral or continuous throughout its length. The header is completed by the addition thereto, one after the other, of a plurality of shorter complementary segments 30ᵇ, 30ᶜ and 30ᵈ.

In butt welding by the resistance method, in which a current is passed across the joint and the two parts are pressed together, it is a disadvantage to have joints, such as 22, Fig. 3, which are oblique to the line of pressure. I prefer, therefore, to form the segments as in Fig. 4 with meeting edges all of which are parallel to the length of the header so that when the parts are pressed together the pressure may be exerted in a direction normal to all the joints.

As shown in these figures, I form the abutting edges 32 and 32ª of the opposed members in a straight line so that the line of weld, as indicated by the dotted lines in Fig. 6, extends in practically the same plane through-

out the entire length of the header. After the several sections 30b, 30c etc. have been welded along their edges 32 and 32a the adjacent ends of these sections are suitably united at the joints 34 for example by arc welding or brazing.

Figs. 7 to 12 inclusive illustrate my method applied to the formation of axle housings. In Fig. 7 the lower portion 40 of the housing is of one continuous piece and the sections 41, 42, 43 and 44 are separately welded along the abutting edges 45 and 46 of said sections. The ends of the sections are then welded along the transverse lines 47, 48 and 49.

In Fig. 9 the axle housing is shown as consisting of a continuous lower portion 50, a central upper section 51 welded thereto and end sections 52 and 53 forming the ends of the housing. The sections 52 and 53 are welded to the center section along the lines 54 and 54'. The lines of weld 54 and 54' in Fig. 9 are substantially perpendicular to the longitudinal welded joint 55 as shown. Instead of making the joints 53 and 54 perpendicular to the axis of the housing, I may cut the sections so that they are welded on a diagonal line as shown at 56 in Figs. 11 and 12. With the diagonal joint there is a greater resistance to torsion and less strain is put upon the welded joint.

My method as herein described provides a simple and comparatively inexpensive way of making boiler headers and similar hollow articles. The products obtained serve their respective functions equally as well as similar products made by other members even though they are produced in a much less expensive manner.

Though I have described with great particularity the steps in my improved method and the construction and characteristics of certain specific articles, it is not to be construed that I am limited thereto as various changes may be made by those skilled in the art without departing from the invention as defined in the appended claims.

What I claim is:

1. The method of making hollow articles which consists in forming one continuous piece of the desired shape, and forming a plurality of separate pieces and electrically butt-welding said pieces in succession to the continuous piece, the separate pieces being so short that the operation is performed by the expenditure of a comparatively small quantity of current at a time.

2. The method of manufacture of metal articles which consists in forming one continuous piece to the desired shape and forming a plurality of separate pieces and butt-welding said separate pieces in succession to the continuous piece and to each other, the separate pieces being so short that the operation is performed by the expenditure of a comparatively small quantity of current at a time.

3. The method of making hollow articles which consists in forming one continuous piece to the desired shape, and forming a plurality of complementary pieces and electrically butt-welding the said complementary pieces in succession to the continuous piece, the separate pieces being so short that the operation is performed by the expenditure of a comparatively small quantity of current at a time.

4. In the making of boiler headers of sinuous shape with a line of staggered holes for boiler tubes, the method which consists in forming segments of substantially U-shaped cross-section with openings of different sizes in the sides, the openings in the sides of one segment being staggered with relation to those of corresponding size in the other segment, and with edges cutting across said openings in lines substantially parallel to the length of the header, and uniting said segments by butt-welding said edges together.

5. A hollow article of the class described comprising a segment which is integral throughout its length, and a plurality of shorter complementary segments which are butt-welded to the longitudinal edges of said integral segment.

6. A hollow article of the class described comprising a segment which is integral throughout its length and a plurality of shorter complementary segments which are butt-welded to said integral segment along edges which are parallel to the length of the article.

7. A boiler header comprising a hollow sheet metal member having opposed walls bent to form substantially parallel sinuous sections, said walls having integral flanges which are united to form flat walls, said flat walls having a line of staggered openings formed therein for the reception of boiler tubes, said flanges being welded together along lines substantially parallel to the length of the header and offset from the centers of the openings.

In witness whereof, I have hereunto signed my name.

THOMAS E. MURRAY.