

Dec. 19, 1922.

G. H. PHELPS ET AL.
FORMING FLANGES ON TUBES AND SIMILAR ARTICLES.
FILED JULY 8, 1921,

1,439,480

2 SHEETS-SHEET 1

Fig. 1,

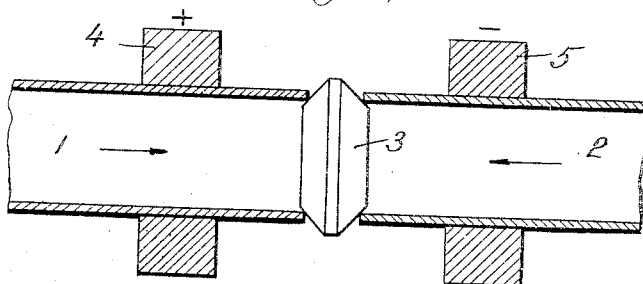


Fig. 2,

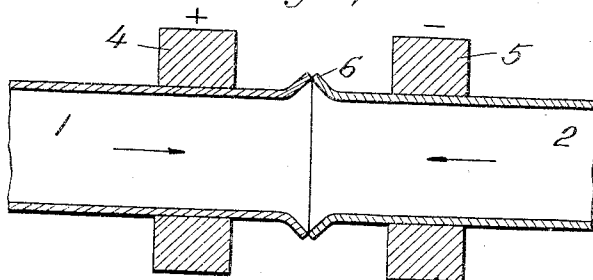
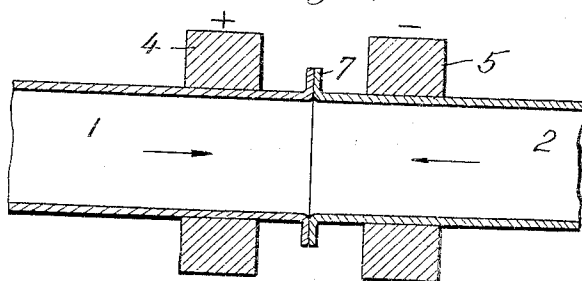


Fig. 3,



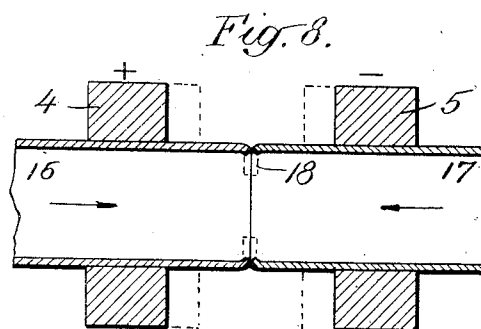
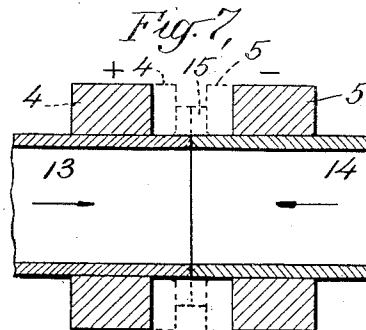
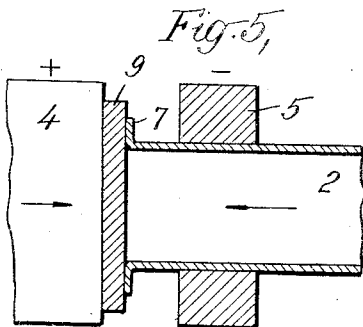
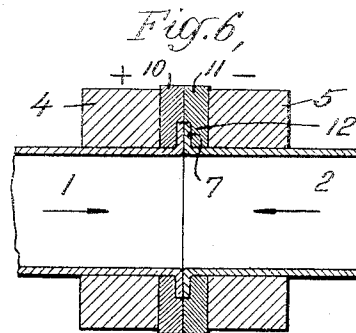
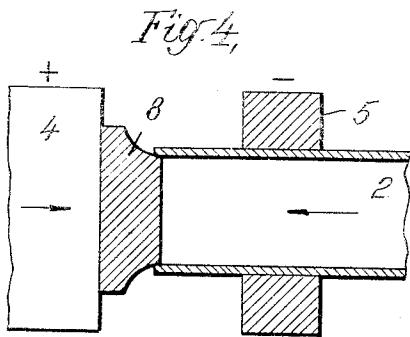
Inventor
George H. Phelps and Thomas E. Murray, Jr.
By his Attorney
R. Anthony Lima

Dec. 19, 1922.

G. H. PHELPS ET AL.,
FORMING FLANGES ON TUBES AND SIMILAR ARTICLES,
FILED JULY 8, 1921,

1,439,480

2 SHEETS-SHEET 2



Inventors
George H. Phelps and Thomas E. Murray, Jr.
By his Attorney
W. Anthony Quinn

UNITED STATES PATENT OFFICE.

GEORGE H. PHELPS, OF WAREHOUSE POINT, CONNECTICUT, AND THOMAS E. MURRAY, JR., OF BROOKLYN, NEW YORK; SAID PHELPS ASSIGNOR OF HIS ENTIRE RIGHT TO THOMAS E. MURRAY, OF BROOKLYN, NEW YORK.

FORMING FLANGES ON TUBES AND SIMILAR ARTICLES.

Application filed July 8, 1921. Serial No. 483,170.

To all whom it may concern:

Be it known that we, GEORGE H. PHELPS and THOMAS E. MURRAY, Jr., citizens of the United States, said PHELPS residing in Warehouse Point, Connecticut, and said MURRAY residing in Brooklyn, Kings County, New York, have invented certain new and useful Improvements in Forming Flanges on Tubes and Similar Articles, of which the following is a specification.

Our invention aims to provide a simple cheap method for flanging tubes and the like.

The accompanying drawings illustrate embodiments of the invention.

Figs. 1, 2 and 3 are longitudinal sections illustrating one method;

Figs. 4 and 5 are similar views of an alternative method;

Fig. 6 is a section of the invention applied to the providing of special heavy flanges on the ends of the tubes;

Figs. 7 and 8 are sections showing other applications of the invention.

In the cases shown the tubes may be circular or of any other cross-section and it is assumed that the flange desired is at a right angle to the axis of the tube. The invention may be applied, however, to other shapes, such as segments of tubes, and to the production of flanges which are not at a right angle to the axis.

Referring to the embodiment of the invention illustrated, and first to Figs. 1, 2 and 3, the tubes 1 and 2 are placed end to end with a mandrel 3 between them and are clamped in positive and negative electrodes respectively, 4 and 5. The tubes are pressed toward each other and a current is passed through the electrodes and from one tube through the mandrel to the other. The current is insufficient for welding but is sufficient to soften the metal of the pipes. At first the softening will be greatest on the ends of the pipe because of the comparatively poor contact at this point and these ends will be expanded on the mandrel as the two pipes are pressed together. As points in the rear of the end of the pipe come to bear against the mandrel the resistance here will also be comparatively great and the metal will be also softened. Thus there is a gradual heating, commencing at the end of the pipe and progressing backward as

the flange is bent outward. If an oblique flange is desired like that shown at 6 in Fig. 2 the current and pressure will be cut off when such a flange has been formed, and the mandrel may be dropped out by separating the ends of the pipe and the pipes then withdrawn from the electrodes.

If a square or right angled flange is desired, the mandrel 3 will be dropped by separating the pipes after the flanges 6 have been formed. The pipes will then be pressed together again with the flanges 6 in direct contact. On again applying pressure and current the gradual outward bending of the flanges 6 will be repeated until they are bent to the square form shown at 7 in Fig. 3.

The above described process has an advantage in that it forms flanges on two tubes at one operation. The same principle, however, may be applied to the flanging of a single tube, as shown for example in Figs. 4 and 5. Here the end of the tube 2 is pressed against a mandrel 8 which is backed by an electrode 4. The pipe 2 is clamped in an electrode 5. The applying of current and pressure will bend the end of the pipe outward to an extent determined by the shape of the mandrel. This may complete the desired flange. Or if a square flange is desired the current may be cut off and the tube drawn back to drop the mandrel 8 and to permit the substitution of a flat faced mandrel 9, Fig. 5. The current being again applied and the tube 2 being pressed up against this mandrel a right angled flange will be produced.

For the making of steam-tight pipe joints it is customary to mount on the ends of the pipes a flange made of a separate ring of heavy material which is machine-faced and bolted with suitable intermediate packing against a similar flange on the next pipe. Our invention provides an easy way of mounting such separately formed rings or flanges on the ends of the pipe. For example, in Fig. 6 are shown a pair of tubular members which are bent on the ends to form flanges 7 by any of the variants of this invention described above or hereinafter. Before the bending operation separately formed rings or flanges of extra heavy material, 10 and 11, are mounted just back of the ends of the pipe sections. They may

bear, for example, against the forward faces of the electrodes 4 and 5. When the current is applied and the pipe sections pressed together the flanges 7 will be formed up within recesses 12 in the separate flange members so as to practically fill these recesses. Either in the same operation or in a subsequent operation the integral flanges 7 are welded to the separate flanges 10 and 11 by spot welding, projection welding, or other means.

It is not essential that a separate mandrel be used to start the flanging operation. With pipes of certain proportions they may be pressed toward each other with their ends in direct engagement. For example, in Fig. 7, the two tubes 13 and 14 are shown with a comparatively heavy wall in proportion to their diameter, so as to hinder the telescoping of one into the other, and are pressed in direct engagement with each other. The turning on of the current will then soften the metal, first at the engaging ends and as these bend out, gradually backward therefrom so as to form up square flanges 15. The electrodes may be so positioned that when they are advanced to the dotted line position shown and the flanges are completed they will bear against the rear faces of such flanges. The metal in this case will bend outward rather than inward because there is less resistance to bending in the outward direction.

The process may be applied, however, to the forming of inward flanges by properly shaping the ends of the tubes. For example, in Fig. 8 there are shown tubes 16 and 17, the ends of which have been first bent inward either cold or by a method similar to Fig. 1 using a properly shaped mandrel to bend the ends inward. They are then butted against each other, clamped in the electrodes 4 and 5 and pressed together while the current is on. The ends will be softened and gradually bent to form internal flanges 18. Not only may a mandrel be dispensed with as explained above, but the process may be carried out with two or more successive mandrels which may be desired in special cases. After the flanges are formed as described they may be pressed, machined, bored and finished in various other ways, according to the uses to which they are to be put. The invention is applicable to flanging not only of the ends but also of intermediate portions of the tubes or the like to which it is applied. The invention is also applicable in some of its features without the use of the particular method described for softening the metal.

In the operation shown in Fig. 2 a flat plate may be placed between the ends of the tubes. This prevents lapping of the edges

and produces more uniform flanges; being similar in this respect to the flat mandrel 9 of Fig. 5. The use of such a flat plate, however, is not essential.

Though we have described with great particularity of detail certain embodiments of our invention yet it is not to be understood therefrom that the invention is restricted to the particular embodiments disclosed. Various modifications thereof in detail and in the order of the steps may be made by those skilled in the art without departure from the invention as defined in the following claims:

What we claim is:

1. The method of flanging outwardly the open end of a tube which consists in heating it by the passage of an electric current through it and through an abutment engaging the end thereof and pressing it longitudinally against the abutment.

2. The method of flanging a tube which consists in placing two tubes end to end and forcing them toward each other to bend their ends.

3. The method of flanging a tube which consists in placing two tubes end to end with a mandrel between them and forcing them toward each other to bend their ends against said mandrel.

4. The method of flanging a tube which consists in placing two tubes end to end with a mandrel between them and forcing them toward each other to bend their ends against said mandrel, removing the mandrel and placing the tubes end to end and further forcing them toward each other to further bend their ends.

5. The method of flanging a tube which consists in placing two tubes end to end and forcing them toward each other while passing a current between them sufficient to soften them and cause the bending of their ends.

6. The method of flanging a tube which consists in placing two tubes end to end with a mandrel between them and forcing them toward each other while passing a current between them sufficient to cause the bending of their ends against said mandrel.

7. The method of flanging a tube which consists in placing two tubes end to end with a mandrel between them and forcing them toward each other while passing a current between them sufficient to cause the bending of their ends against said mandrel, removing the mandrel and placing the tubes end to end and further forcing them toward each other to further bend their ends.

In witness whereof, we have hereunto signed our names.

GEORGE H. PHELPS.
THOMAS E. MURRAY, JR.