

Jan. 22, 1929.

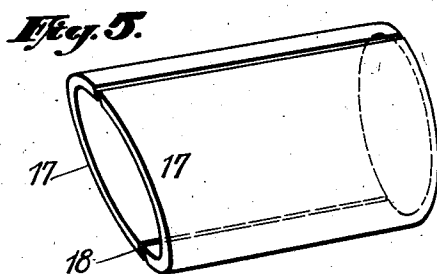
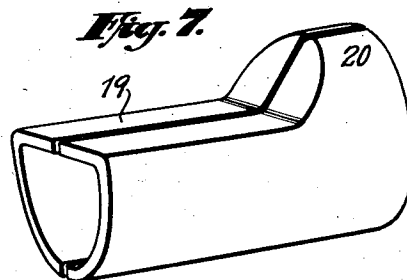
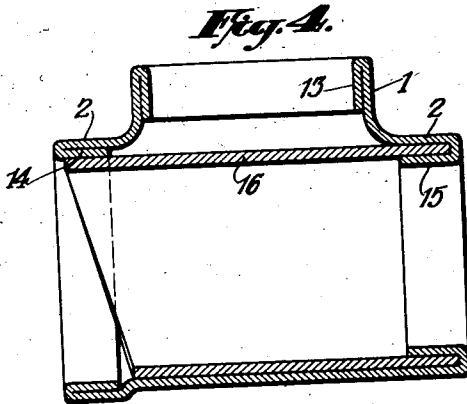
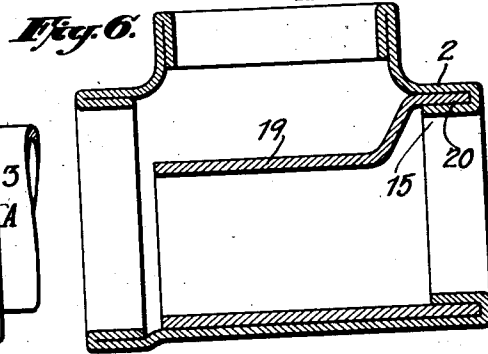
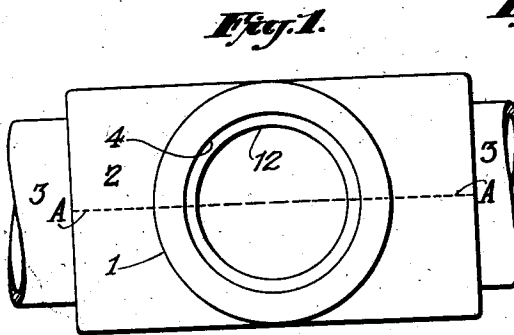
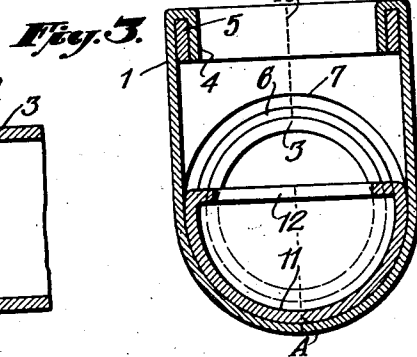
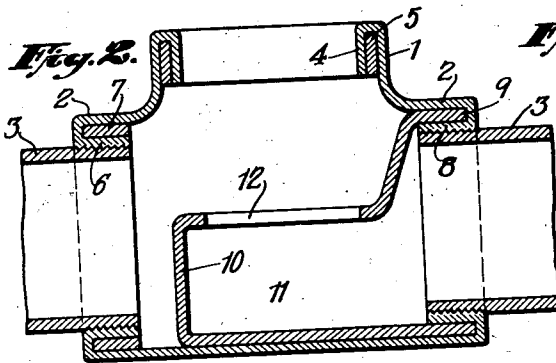
1,699,541

T. E. MURRAY

MAKING TUBULAR FITTINGS AND THE LIKE

Filed Feb. 8, 1927

4 Sheets-Sheet 1



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By His Attorney

R. Anthony Medina

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Fig. 8.

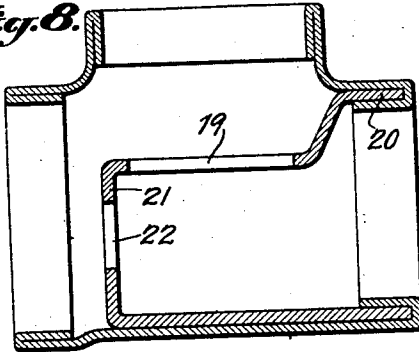


Fig. 9.

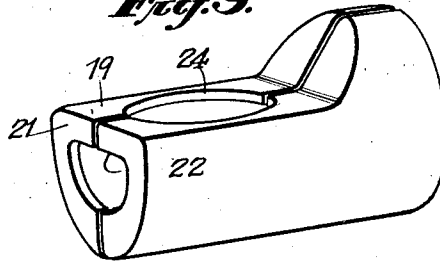


Fig. 10.

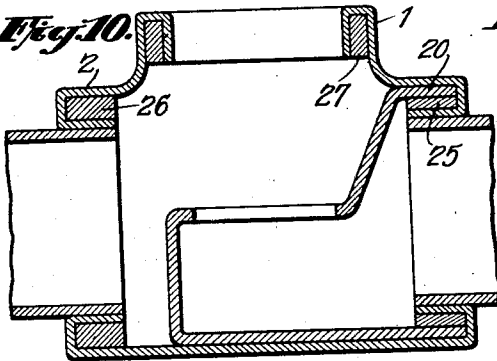


Fig. 11.

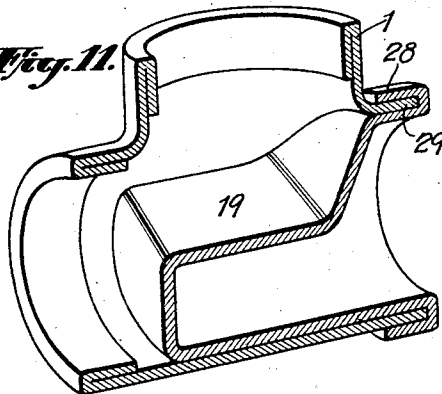


Fig. 12.

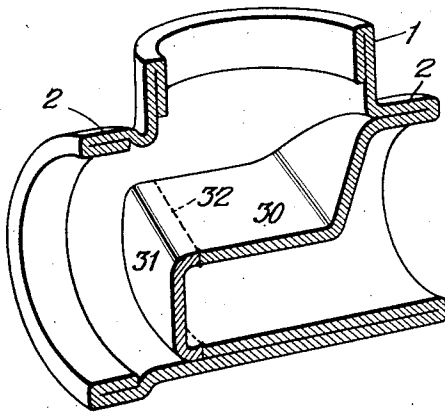
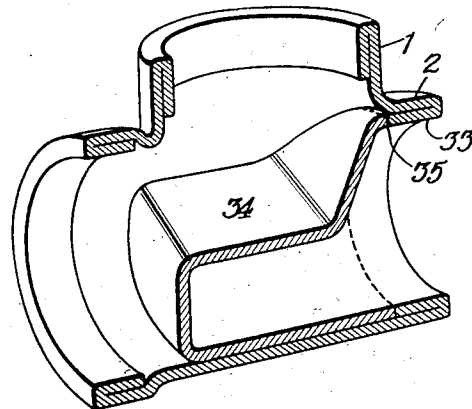


Fig. 13.



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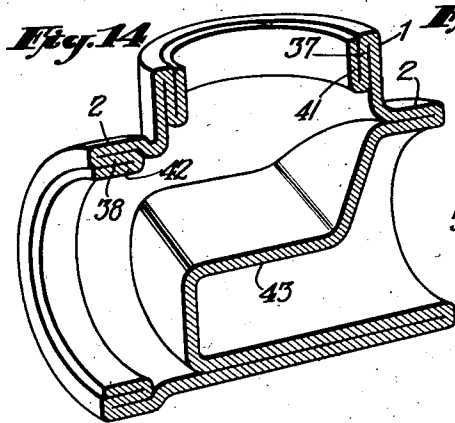


Fig. 15.



Fig. 16.

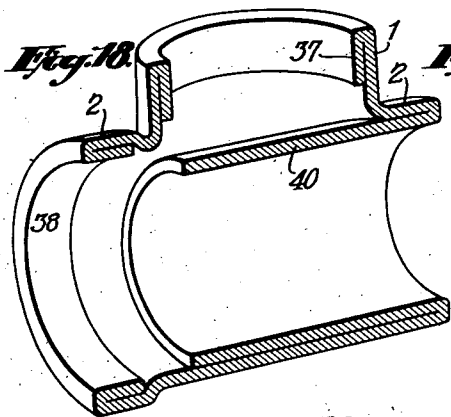
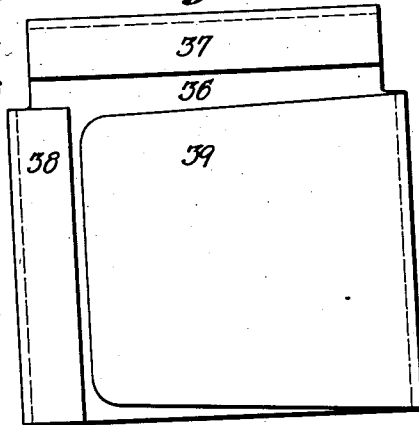


Fig. 17.

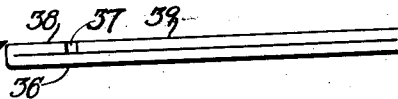


Fig. 19.

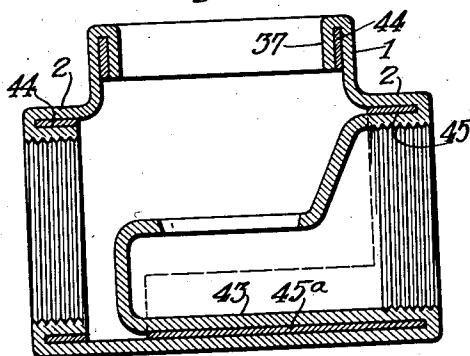


Fig. 20.

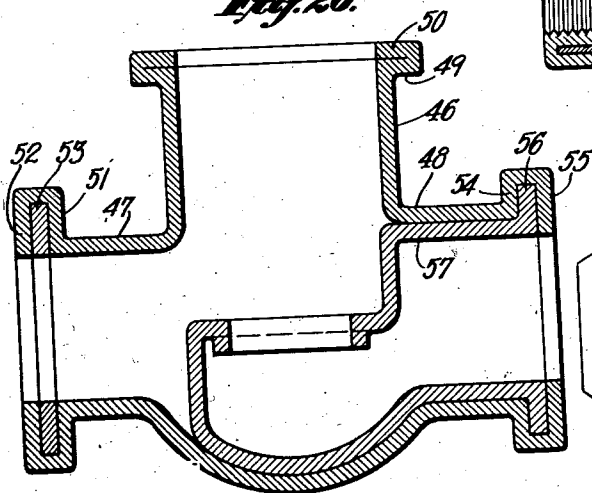
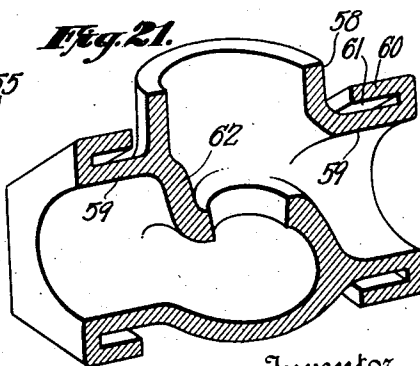


Fig. 21.



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Fig. 22.

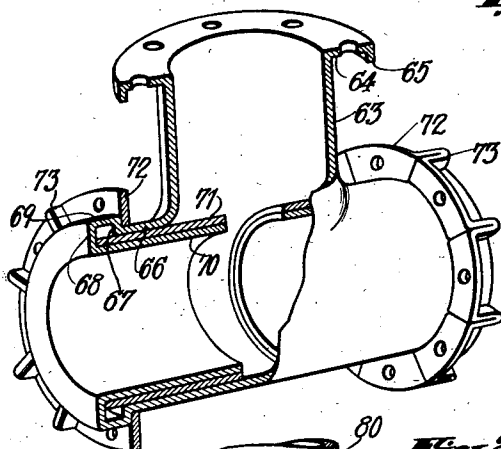


Fig. 23.

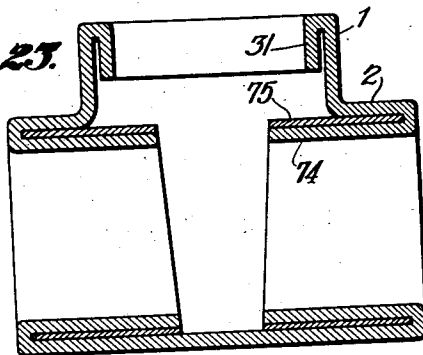


Fig. 24.

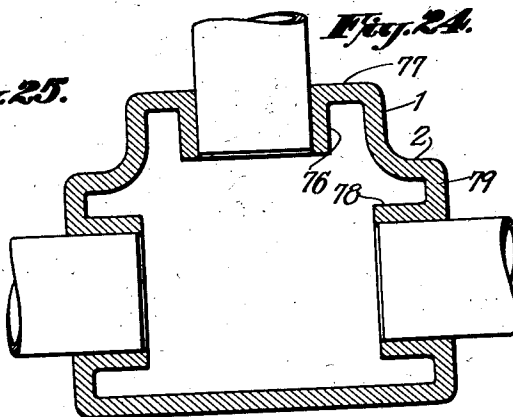


Fig. 25.

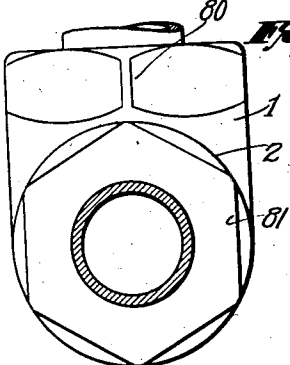


Fig. 26.

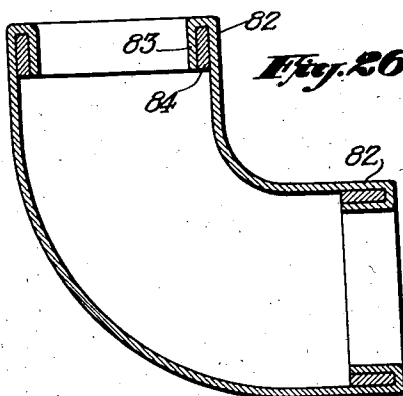


Fig. 27.

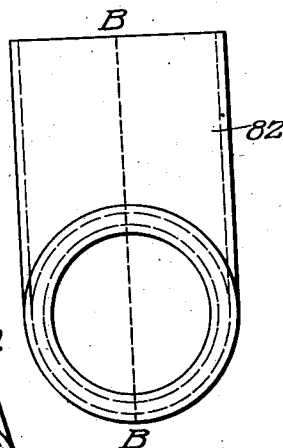


Fig. 29.

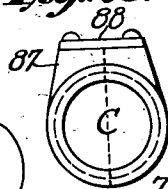
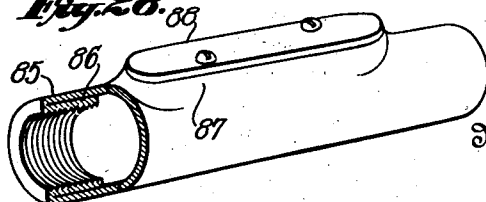


Fig. 28.



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MAKING TUBULAR FITTINGS AND THE LIKE.

Application filed February 8, 1927. Serial No. 166,625.

In certain previous Patents Nos. 1,518,599, dated December 9, 1924; 1,586,690 and 1,586,691, dated June 1, 1926, I have described methods of welding segments which are thicker at one point than at another, and the production in this way of valve casings, T's and other tubular parts.

My present invention is directed to the efficient production of the same and similar articles, with certain improvements in the process and products.

The accompanying drawings illustrate embodiments of the invention.

Fig. 1 is a plan;

Fig. 2 is a longitudinal section and Fig. 3 a transverse section of a globe valve;

Figs. 4 to 9 illustrate the method of producing such a globe valve; Figs. 4 and 5 being a longitudinal section and a perspective view of the parts at an early stage of the operations; Figs. 6 and 7 being similar views of the parts in the next stage, and 8 and 9 being similar views at a still later stage;

Fig. 10 is a longitudinal section of another globe valve casing;

Figs. 11, 12, 13 and 14 are sectional perspectives illustrating other methods of manufacture of globe valve casings;

Figs. 15 to 18 illustrate steps in the production of the casing of Fig. 12; Figs. 15 and 17 being end and side edge views of the folded blank shown in face view in Fig. 16, and Fig. 18 showing a segment in condition just before the operation indicated in Fig. 12;

Figs. 19 and 20 are longitudinal sections of still other styles of globe valve casings;

Fig. 21 is a perspective sectional view of another style of globe valve casing;

Fig. 22 is a perspective sectional view illustrating a gate valve with special flanges;

Fig. 23 is a sectional view of another type of gate valve casing;

Figs. 24 and 25 are a longitudinal section and an end elevation respectively of a T;

Figs. 26 and 27 are respectively a longitudinal section and an end elevation of an elbow;

Fig. 28 is an elevation partly in section of a fitting used in electric wire conduits;

Fig. 29 is an end view of the same.

My invention has probably its greatest value in connection with valve casings because of the cost of making them by known methods and with the required accuracy and

strength. This comparative value is also considerable in making T's, L's and other angular fittings. And for straight fittings like that of Fig. 28 and even for simple pieces of tubing, it is valuable in cases where reinforced ends are desired.

According to Fig. 1, the valve casing is a T-shape with a branch 1 and end portions 2 which are threaded or otherwise connected to pipes 3. The end of the branch 1 is reinforced by folding it over double as at 4; and is further reinforced by a ring 5 embraced between the two thicknesses of metal. One of the ends 2 is similarly reinforced by a folded over portion 6 embracing a separate ring 7. The opposite end 2 is similarly folded over at 8 and further reinforced by embracing the ring-shaped end 9 of a diaphragm designed to form or to carry the usual valve seat. This diaphragm has a closed inner end 10 and a semi-circular intermediate portion 11 (see Fig. 3), in the upper portion of which the opening 12 is provided for the valve.

A similar casing may be made without the separate reinforcing rings 5 and 7. Figs. 4 to 9 show how such a casing can be produced; and it is obvious how it can be modified to include the separate reinforcing rings. The complete casing is made up in two halves with their edges in the plane indicated by the dotted line A-A in Figs. 1 and 3 and the parts are then brought together and welded along the several joints lying in such plane. It will be observed that this is the plane of the axes of the two parts of the fitting which lie at an angle with each other. Starting with a flat blank of approximately T-shape, the edges are folded over to make a double thickness and the blank drawn or bent up to segmental shape, providing extra thicknesses of the original sheet metal at 13, 14 and 15, Fig. 4.

A tubular piece 16 is inserted in the position shown into the space between the parts 2 and 15; the opposite end being formed sufficiently large to permit the passage of the tubular piece 16. The latter may be a piece of ordinary tubing or it may be formed in the manner shown in Fig. 5 of two segments 17 welded together on the lines 18. Or one of the parts 17 while flat may be assembled on each of the flat blanks for the outer casing and its end caught under the thickness 15 when the latter is folded over, the two parts

17 being then welded together when the segments of the outer casing are welded together. The parts being welded as described are thereafter re-shaped as shown in Figs. 6 to 9.

The inner portion of the tube 16 is swaged to the substantially semi-circular cross-section 19, leaving the ring 20 at the end caught between the parts 2 and 15 of the shell. The end of the part 19 is then swaged or bent inward to form an end portion 21 (Fig. 8), with an opening 22 which may be subsequently closed by a piece inserted and arc welded or otherwise united. The next operation consists in punching a hole 24 in the top of the part 19, as in Fig. 9. The left-hand end of the T may be swaged to reduce its diameter to that of the opposite end, if it was originally left larger than desired. This completes the product except for the usual operations of threading, swaging, machining or otherwise shaping the edges of the metal around the several openings for making the necessary connections.

Fig. 10 illustrates a slight modification in which the reinforcing rings in the ends are made of different thicknesses. In the right end the inserted ring 25 is of the least thickness, being associated with the ring 20 forming part of the diaphragm structure. In the left-hand end 2 the separate reinforcing ring 26 is thickest to match the double thickness at the right-hand end. And the ring 27 of the branch 1 is of intermediate thickness corresponding to its smaller diameter.

Fig. 11 shows a variation in which the inserted piece 19 for forming the diaphragm is folded over at its outer edge to provide an outside thickness 28 which encloses the single thick end portion 29 of the shell.

According to Fig. 12 the right-hand branch 2 is folded over to a very considerable length (before bending up to segmental shape) to form the greater portion 30 of the diaphragm, the latter being completed by an end piece 31 which is welded to the part 30 along the line 32.

According to Fig. 13, the end 2 is folded over for a short length to form a simple ring 33. And the diaphragm member 34 for its entire length is a separate piece welded to the flange 33 as indicated at 35.

Fig. 14 illustrates a segment where an additional reinforcement at the flange has been obtained by a double fold in the blank as indicated at 41 and 42. The same idea may be applied to the designs shown in the other figures; and may be extended to form three or more folds.

Figs. 15 to 18 show the process of shaping the segment shown in Fig. 12. The blank 36 has the edge of its branch portion bent over to form a fold 37 and its left-hand end similarly bent over to form a narrow fold 38. The opposite end is folded over a considerable length to provide a portion 39 from which

the diaphragm is to be shaped. The parts may then be drawn up to the position of Fig. 18 with the folds 37 and 38 forming parallel reinforcements of their respective ends. After welding the two segments the part 40 may be swaged as shown at 30 in Fig. 12 and the piece 31 subsequently welded thereto.

By using a number of preliminary operations the completed segment shown in Fig. 12 could be formed up with the pieces 31 integral with 30 but for economy in operation we prefer to weld 31 to 30.

Fig. 19 illustrates a slight modification of the same construction. An insert 44 is introduced between the two thicknesses of metal at the branch 1 and a similar insert at the left-hand end 2. At the right-hand end there is an insert comprising a ring portion 45 and an extension 45^a between the bottom of the casing and the inner part of the diaphragm member 43. This figure shows the ends of the fittings internally threaded.

It will be understood that this and various other usual or suitable fastening means may be applied to the several fittings illustrated herein. Where there is an extra thickness of metal within the shell as in this case, there is an advantage in that a fitting of a given size may be adapted to larger or smaller pipes by making the threads on a larger or smaller diameter. This is a substantial economy compared with the making of separate dies for fittings for each small variation in the diameter of the pipe.

Fig. 20 shows the invention applied to the folding over of the metal double at the ends but in transverse direction instead of axial as in the previous fittings. Here there are comparatively long branches and ends 46, 47 and 48. The branch 46 is reinforced by bending the metal first outward to form the flange 49 and then inward to form the second thickness 50. The other ends are similarly reinforced. At the left-hand end are flanges 51 and 52 between which is a separate ring 53; at the right-hand end 48 there are similar flanges 54 and 55 between which is a ring 56 constituting a flange on the internal diaphragm member 57.

This valve is made on the same principle as the others previously described, of segments welded together on the plane of the two axes at an angle with each other. The diaphragm member can be completed or partially completed before assembling it with the segments, or can be made in segments united at the same time as the segments of the outer shell, as above described.

Fig. 21 illustrates a segment which can be best made by forging. The branch 58 is without end reinforcement. The opposite ends 59 are identical and are stiffened by portions 60 folded back to substantially parallel position with spaces 61 between the two folds of metal. The diaphragm member 62 is in-

tegral with the shell. It will be observed that this segment presents edges to be welded which are of substantially or approximately the same thickness throughout, this effect being secured at the reinforced ends by spacing the folds apart as illustrated.

Such a segment presents an advantage in welding by the method described in my former patents, in that the path for the welding current presents about the same resistance at all points in the length of the joint. This is a desirable condition and should be secured to as great an extent as possible.

Fig. 22 illustrates the invention applied to the making of a gate valve. The upper branch 63 is bent over to provide a transverse flange 64 for the passage of fastening bolts and an outer flange 65 in the axial direction. Each of the ends 66 is bent outward and inward to provide parallel folds 67 and 68 in the transverse direction, and 69 and 70 in the axial direction. The spacing of these portions apart from each other not only facilitates welding as above described, but avoids the excessive strain on the metal which is involved in bending it double directly upon itself.

A reinforcing ring 71 is inserted between the parts 66 and 70, and the parts 70 and 71 are extended inward to form a seat at one side of the valve. The rib formed by the bends 67, 68 and 69 are useful in bolting the fitting to an adjacent flanged pipe. For this purpose a bolt ring 72 is located behind the shoulder formed by the part 67, and is folded to provide flanges 73 which stiffen it and which overlie the part 69.

Fig. 23 illustrates the design of a smaller gate valve. It is simply a T like that of Fig. 19 with the ends bent inward as at 74 to provide seats at opposite sides of the valve. Reinforcing rings 75 are shown between the parts 74 and the end portions 2 of the shell. They may be omitted, however, leaving a space, as illustrated for the end of the branch 1, and leaving metal of uniform thickness throughout the length of the joint to be welded.

This principle is carried further in the small T illustrated in Figs. 24 and 25. Here the branch 1 is bent in to provide an axial fold 76 spaced from the outer shell a considerable distance by the transverse portion 77; and the ends 2 are bent in to form similar parallel folds 78 spaced inward to the extent of the transverse portions 79. The several ends are swaged to the hexagonal shapes shown at 80 and 81 in Fig. 25. The spacing of the folds of metal at the ends permits such swaging of the outer shell without affecting the size and shape of the inner folds.

Figs. 26 and 27 show the same principle applied to the making of an L. This is made of segments united along the line B-B, Fig. 27. Each of the ends 82 is bent over to pro-

vide an inner fold 83 spaced apart from the shell and embracing between itself and the shell a reinforcing ring 84. Or the reinforcing ring may be omitted, bringing the two parts 82 and 83 into direct contact, or spacing them apart with the advantages stated above.

The conduit or junction box of Figs. 28 and 29 is made of two segments welded together along the axial plane indicated by the line C in Fig. 29. The edges of the blank have been bent inward before stamping to segmental shape so as to provide the ends 85 with a second fold 86 in direct contact with the outer shell. The flange 87 on which the cover 88 is screwed may be similarly reinforced or may be left plain and it will be understood that the invention may in general be applied to all the ends of the tubular products referred to or only to one or more ends as circumstances may require.

In most of the figures of the drawing, I have illustrated the product after completion. It will be understood for each of the structures illustrated that it is made in a manner similar to those illustrated in connection with Figs. 4 to 9, and Figs. 14 to 18; by bending the ends of the flat blank, then stamping the blank up to segmental shape with double-thick ends and welding the edges of such segments; with or without the insertion of a separate diaphragm or separate rings between the two thicknesses at the ends.

Various other modifications may be made by those skilled in the art without departing from the invention as defined in the following claims.

What I claim is:—

1. In the making of tubular products, the method which includes folding over the end of the flat blank to provide extra thicknesses of metal and bending the same to form segments of semi-circular cross-section with the folded portions constituting the ends of the segments and with edges extending in the direction of the axis and welding two of such segments together along such edges.

2. In the making of tubular products, the method which includes folding over the end of a flat blank about an insert to provide extra thicknesses of metal with the insert between them and bending the same to form segments of semi-circular cross-section with the folded portions constituting the ends of the segments and with edges substantially parallel thereto and welding two of such segments together along such edges.

3. The method of claim 1, applied to the forming of tubular products with the axes of different portions at an angle with each other.

4. The method of claim 1, the folded over portion being spaced apart from the adjacent portion.

5. The method of claim 1, applied to the forming of a T-shaped fitting or casing.

6. The method of claim 1 applied to the forming of a valve casing with an internal diaphragm portion.

7. The herein described tubular product
5 formed of longitudinal segments of semi-circular cross-section welded together along their longitudinal edges and having ends of two parallel thicknesses of the metal.

8. A tubular product having portions with
10 their axes at an angle to each other, said product composed of segments of substantially semi-circular cross-section welded together

on their longitudinal edges and said segments having their ends folded over to form extra thicknesses of metal. 15

9. A valve casing formed of segments of substantially semi-circular cross-section each including a part of a diaphragm, welded together along their longitudinal edges, said segments having their ends folded over to provide extra thicknesses of metal. 20

In witness whereof, I have hereunto signed my name.

THOMAS E. MURRAY.