

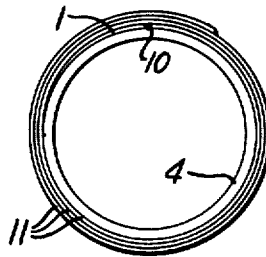
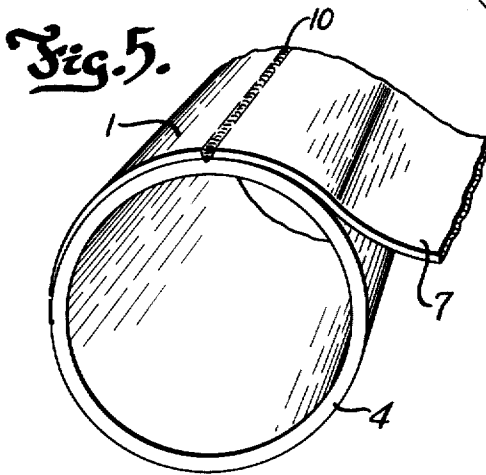
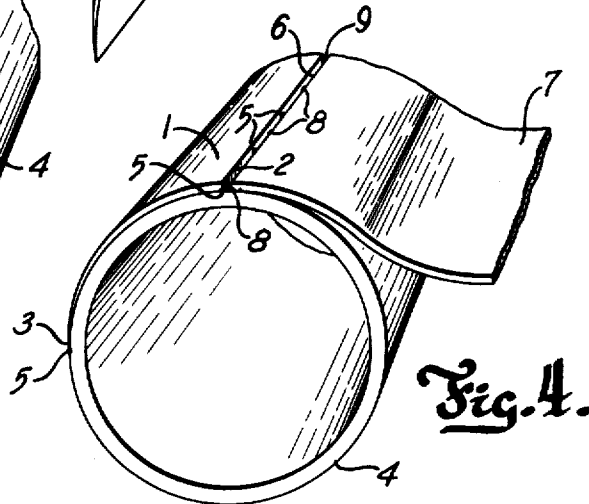
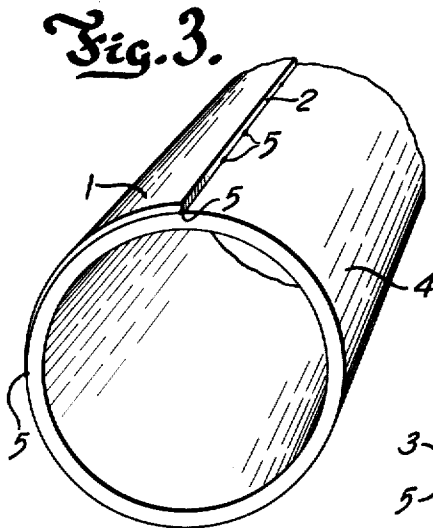
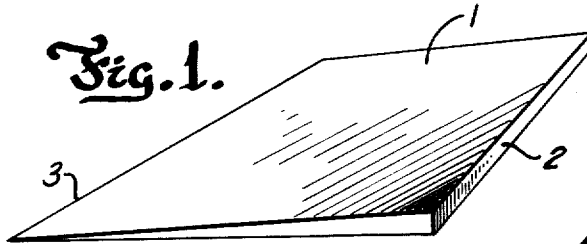
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STARTING JOINTS FOR CONTINUOUS WOUND VESSEL

Filed July 25, 1960



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3,092,148

STARTING JOINTS FOR CONTINUOUS WOUND VESSEL

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1 Claim. (Cl. 138—151)

This invention relates to coil wrapped layer cylinders such as those employed in the fabrication of high pressure vessels. Cylinders produced by coil wrapping as described in the copending application Serial No. 45,099, filed July 25, 1960, by the present inventor, have the problem of providing an inner cylindrical pressure retaining shell and avoiding the air space otherwise between it and a portion of the first coil layer wound thereon adjacent the end edge of the coil.

The start of the coil and the manner of securing the end edge initially to the inner pressure retaining shell becomes of substantial importance. Various suggestions for the start have been proposed in the past.

One proposal is to offset the abutting longitudinal edges of the inner core member by an amount corresponding to the thickness of the subsequent starting edge of the coil. This proposal, however, is not too practical since the core seam must be welded for its full thickness and in doing so it is difficult to retain a proper recess for the coil edge without machining. Furthermore, such a construction would provide a core of less strength than may be desirable since it would have a portion of offset thickness which would develop stress concentrations under load.

Another proposal is to machine a recess in the outer surface of the core to provide a shoulder to which the end edge of the coil may be welded. This too weakens the core and provides stress concentration that may be detrimental.

Still another proposal is to either machine the end portion of the coil to taper it gradually down to a point in thickness, or to secure a gradually tapered piece to the end edge to accomplish the same purpose. This procedure provides only a thin end edge for the coil and makes it difficult to secure the leading edge of the coil to the core for properly starting the wrapping operation.

The present invention proposes to provide a tapered piece or wedge member which is curved to conform to the cylindrical core and extends for a substantial distance circumferentially of the core but less than the full circumference. The tapered thickness of the piece provides one longitudinal edge of a thickness corresponding to the thickness of the sheet to be wrapped on the core, and the other longitudinal edge thinned to a point.

The tapered piece is applied to the core and tacked along its thicker edge to hold it in place. Then the starting edge of the coil is positioned adjacent to the tacked edge and tacked to the core with a space between the two edges forming a welding groove having the core as a bottom.

A fusion weld is then made at the seam between the two edges and this secures the tapered piece in place and also secures the starting edge of the coil sheet ready for start of the wrapping process. Thereafter the sheet is coil wrapped upon the core as set forth in the copending application, Serial No. 45,099, filed July 25, 1960, by the present inventor.

The accompanying drawing illustrates the best mode presently contemplated by the inventor for carrying out the invention.

In the drawing:

FIGURE 1 is a perspective view of a tapered blank employed in the construction of the present invention;

FIG. 2 is a similar view of the blank after curving the same to fit the core;

FIG. 3 is a similar view of a portion of the core and tapered blank fitted and tacked thereon;

FIG. 4 is a view similar to FIG. 3 showing the end portion of a coil sheet positioned and tack welded in place on the core;

FIG. 5 is a view similar to FIG. 4 showing the parts after welding; and

FIG. 6 is an end elevation of a completed cylinder after wrapping.

Referring to the drawing, the blank 1 is tapered in thickness from a longitudinal edge 2 of maximum thickness to a longitudinal edge 3 of pointed thickness. After tapering of blank 1 the latter is curved as shown in FIG. 2 to fit the outer cylindrical wall of core 4 as shown in FIG. 3.

After curved blank 1 has been applied to core 4 as shown it is preferably tack welded thereon as at 5 to hold the blank in place. Then the end edge 6 of a reinforcing sheet 7 to be wrapped upon the core is positioned thereon to face the edge 2 and uniformly spaced therefrom for welding. The edge 6 may be suitably tack welded at 8 to hold the same in place for final welding.

It is desirable that adjacent edges 2 and 6 be of substantially the same thickness. In welding these edges together the groove 9 between the two is filled with fusion weld metal 10 which secures the edges integrally together and bonds the same by fusion to the core 4.

The weld 10 secures the starting edge of sheet 7 to core 4 so that the wrapping process may be started with a desired tensioning of the sheet as it is wrapped upon the core.

The final structure as shown in FIG. 6 comprises the cylindrical core 4 of substantially uniform wall thickness, a plurality of layers of reinforcing metal 11 wound thereon in coil or spiral manner. The transition of the coil layers as one passes outwardly onto the previous turn is gradual by reason of the insert blank 1 at the starting edge of the coil. For this purpose blank 1 preferably extends circumferentially of core 4 a substantial distance such as approximately one quarter of the circumference of the core as shown in FIGS. 3-6.

Without a wedge blank 1 the layers of metal would have a sharp bend as they lift over the end edge 6 and the corresponding bend in each successive previous layer. Such a sharp bend would be detrimental from a stress standpoint and would have an air pocket or void that might weaken the vessel.

The wedge blank 1 of the present invention compels a more gradual rise in each layer as it approaches and overlaps the previous layer, and there is no sharp bend area of undesirable stress concentration. Also the wedge blank 1 serves to eliminate any desirable air pocket.

In completing weld 10, the major objective is to secure edge 6 to core 4, it being unnecessary to secure edge 2 beyond the position securement provided by tack welds 5.

Various modes of carrying out the invention are contemplated as being within the scope of the following claim particularly pointing out and distinctly claiming the subject matter which is regarded as the invention.

I claim:

A cylindrical structure comprising a cylindrical metallic core, a plurality of layers of reinforcing sheet metal coil wrapped thereon with a starting edge extending longitudinally of said core, a metal blank fitted to said core and having a longitudinal edge facing said starting edge and corresponding thereto in thickness to provide a welding joint therebetween, and a fusion weld securing said edges together and to said core, said blank being tapered in thickness away from said weld to provide a gradual approach of substantial circumferential length

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for wrapping of successive layers upon the starting overlap of the previous layer.

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