Dec. 25, 1928. 1,696,725

T. E. MURRAY

DRUM, PIPE, FITTING, ETC

Filed Feb. 12, 1926 2 Sheets-Sheet 1

Fig. 1.

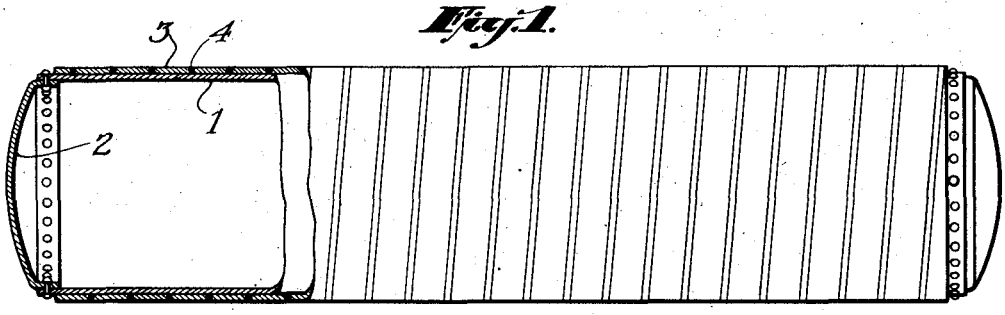


Fig. 2.

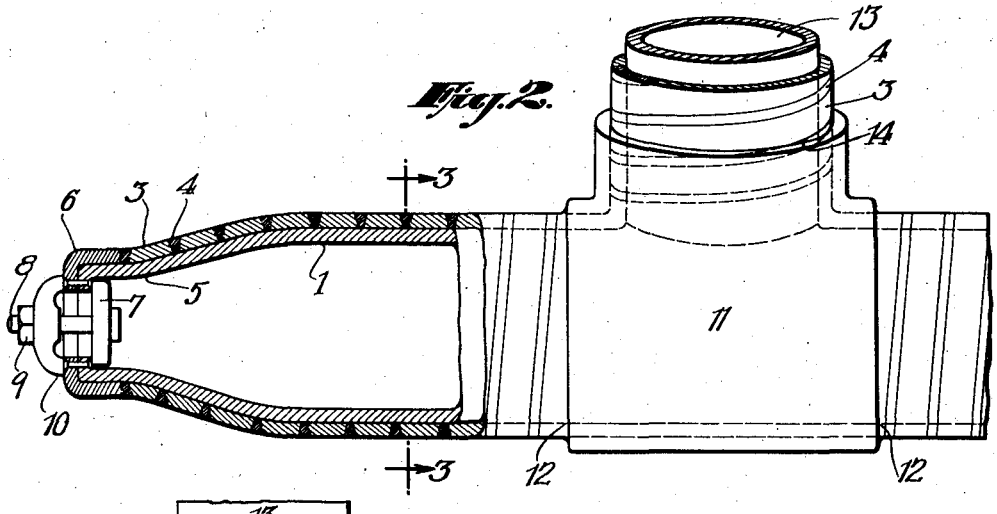


Fig. 3.

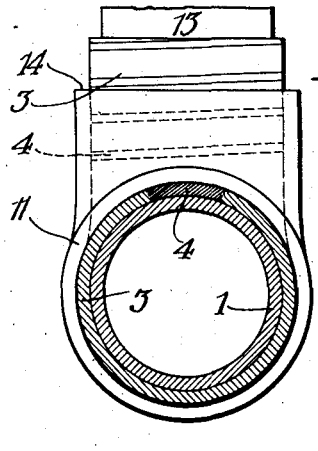
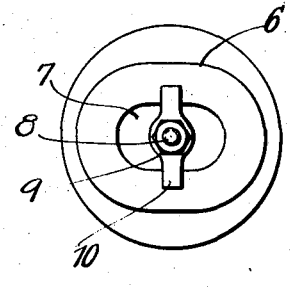


Fig. 4.



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Dec. 25, 1928.

1,696,725

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Fig. 5.

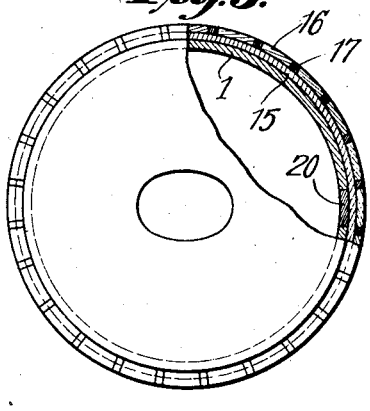


Fig. 6.

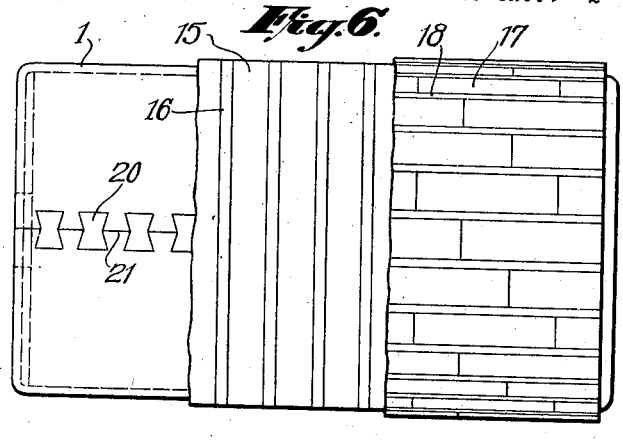


Fig. 7.

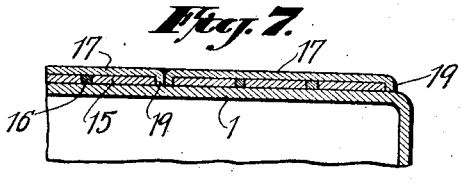


Fig. 8.

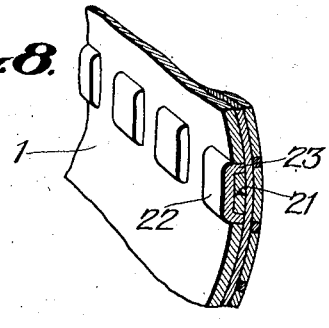


Fig. 9.

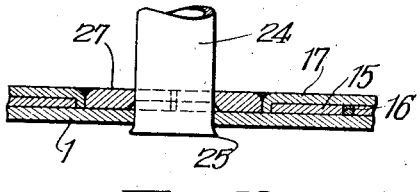


Fig. 11

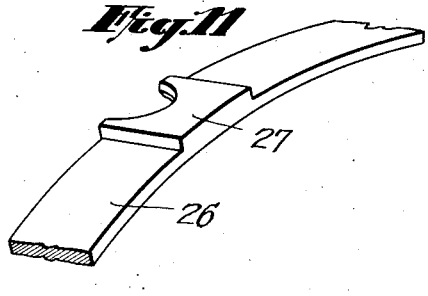
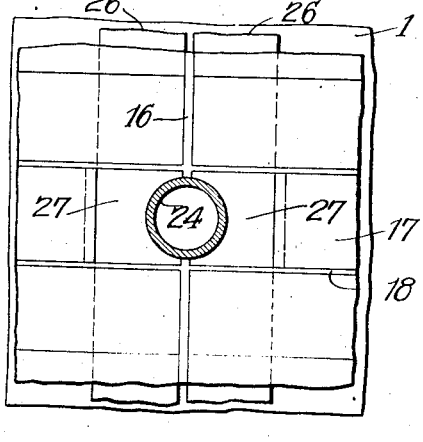


Fig. 10.



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Patented Dec. 25, 1928. 1,696,725

UNITED STATES PATENT OFFICE.

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DRUM, PIPE, FITTINGS, ETC.

Application filed February 12, 1926. Serial No. 87,987.

My invention aims to provide certain means whereby steam drums for boilers, pipes, fittings, and similar tubular products designed to carry fluids at high pressure can be made economically and of great strength.

The accompanying drawings illustrate an embodiment of the invention.

Fig. 1 is a side elevation partly in section of a steam drum for boilers;

Fig. 2 is a similar view of a pipe end with a branch leading therefrom;

Fig. 3 is a cross-section on the line 3—3 of Fig. 2 (omitting a portion of the reinforcement on the branch);

Fig. 4 is an end view of Fig. 2;

Fig. 5 is an end view, partly in section, of an alternative construction embodying the invention;

Fig. 6 is a side elevation of the same broken away to show in separate section the inner tube and the successive reinforcements on the outside;

Fig. 7 is a longitudinal section of a portion of the same;

Fig. 8 is a perspective view illustrating a modification in detail;

Fig. 9 is a longitudinal section showing a branch;

Fig. 10 is a plan of the same;

Fig. 11 is a detail in perspective.

According to my invention the tubular articles referred to may be made from standard drawn tubing, preferably seamless, or from welded or cast or other commercial kinds of tubing.

Referring to Fig. 1, a tube 1 is provided with outwardly convex heads 2 riveted to its ends. To protect it against radial strains is is wound spirally with a flat wire 3 having beveled edges. The convolutions are in contact or approximately so. To hold the wire tightly in place upon the tube, it is secured by depositing metal 4 between the convolutions, filling these spaces and making a rigid structure of the reinforcements, at the same time securing the advantage of the tensile strength of the flat wire. The wire may be of any one of various materials having a high tensile strength. It is preferably extended at its ends beyond the inner edges of the heads 2, as shown at the left of Fig. 1, so that the tube 1 is reinforced throughout its length. The metal 4 may be deposited by an arc welding process so that it holds the wire by being welded thereto as well as by its engagement with the beveled faces of the wire. The filling material will preferably extend continuously spirally from end to end, though it may serve in some cases to apply it only at intervals.

Fig. 2 illustrates a substitute for the riveted heads 2, which can be used in some cases. The inner tube 1 is drawn to a reduced diameter at its end 5 and flanged inward. The reinforcing wire 3 and the holding metal 4 are carried nearly to the end, and over the end is placed a flanged cap 6 which may be held in place by rivets as shown. An oval opening is formed through the flanged end of the tube and through the cap for an oval plate 7, like an ordinary hand hole plate of a boiler, which is drawn tight into place by means of a bolt 8, nut 9 and brace 10 encircling the bolt and bearing against the outer end of the cap.

Where a branch is to be provided, the side of the tube may be drilled through the double thickness of the tube and the reinforcement, and a sleeve 11 slipped over the tube and welded to the tube along its edges 12. Within the sleeve 11 is a branch 13 and this may be reinforced by wire 3 and holding material 4 as in Fig. 1 and welded to the main tube and to the edge 14 of the sleeve.

Figs. 5 to 11 illustrate several modifications in detail. The tube 1 in this case is surrounded by a flat wire 15, not a continuous spiral as in Fig. 1, but in separate convolutions or rings with welding metal 16 between them. In addition straps 17 of metal are laid lengthwise over the rings 15 and are welded together by intermediate lines 18 of welding metal, which not only weld the straps together but also weld them to the rings 15. In addition the straps 17 may be directly welded to the rings 15 by spot-welding or similar electric welding operations. For drums of considerable length, the straps may be made in sections with their ends flanged as at 19 to overlie the outermost rings and to enter the spaces between successive rings as shown best in Fig. 7. Where the successive sections of a strap meet each other they may also be welded together and to the rings within them and to the inner tube 1.

Figs. 5 and 6 illustrate also a method of reinforcing the longitudinal joint of the tube 1 when this is not a seamless tube. For this purpose dove-tailed inserts 20 are fitted into the edges of the tube and these portions of the tube are welded to the inserts and also welded together along the line 21. The same

principle may be applied where the tube is lap-welded instead of being butt-welded as shown.

Fig. 8 illustrates a modification of a reinforcement of the joint. Short straps 22 have tapered ends or flanges 23 which are forced into openings provided near the edges of the tube and these edge portions are welded to the flanges 23 and to each other along the joint 21.

Figs. 9, 10, and 11 illustrate a method of connecting to the reinforced tube a branch 24, which may be, for example, a pipe leading from a boiler into the header. The pipe is expanded to provide an enlarged end 25 inside of the tube 1 and a pair of rings 26 of special design are passed around the tube at this point. These rings are upset to provide portions 27 with semi-circular recesses embracing the branch 24 and of extra thickness so as to bring the metal up to substantially the level of the longitudinal straps 17, which are butted against it as shown in Fig. 10 and welded thereto.

The winding of rings or spirals around the drum provides a very high resistance to transverse bursting strains, and the welding of these parts together serves to distribute the strains throughout adjacent rings or convolutions. The longitudinal reinforcement adds to the resistance to longitudinal strains, resists the tendency of the rings or convolutions to separate under longitudinal expansion and stiffens the entire drum. It will be understood that the longitudinal reinforcement may be used with the spiral winding of Fig. 1 as well as with the separate rings of Fig. 6; and that the other details illustrated in Figs. 5 to 11 may be applied equally to the arrangement of Figs. 1 to 5. Likewise the bevel-edged wire, the reduced end and the other details of Figs. 1 to 5 are adapted to be applied to the design of Figs. 5 to 11.

Drums made in accordance with this invention will have a very high resistance to bursting and other strains. By using a plurality of such drums on a boiler to secure the capacity of a single large drum, I can replace at a comparatively small cost the extremely expensive drums which are now commonly employed for the largest type of boilers.

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

What I claim is:—

1. A tubular pressure-resisting vessel consisting of an inner tube with reinforcing rings welded in place around it and having in addition longitudinal reinforcing members.

2. A tubular pressure-resisting vessel consisting of an inner tube with reinforcing rings welded in place around it and having in addition longitudinal reinforcing members, said circular and longitudinal reinforcing members being welded together.

3. A tubular pressure-resisting vessel consisting of an inner tube with reinforcing rings welded in place around it and having in addition longitudinal reinforcing members, said circular and longitudinal reinforcing members being welded together and locked in engagement with each other.

4. A steam drum for boilers comprising an inner tube with closed ends and having reinforcing rings welded in place around it and having also longitudinal reinforcing members welded in place.

5. A tubular pressure-resisting vessel consisting of a solid inner tube, a reinforcement around the same in rings having flat faces in engagement with the inner tube and being spaced apart from one another and deposited metal between the rings for holding them together and in engagement with the inner tube.

In witness whereof, I have hereunto signed my name.

THOMAS E. MURRAY.