P. BALL.

Joints for Sheet-Metal Vessels.

No. 151,072. Patented May 19, 1874.

FIG. I.

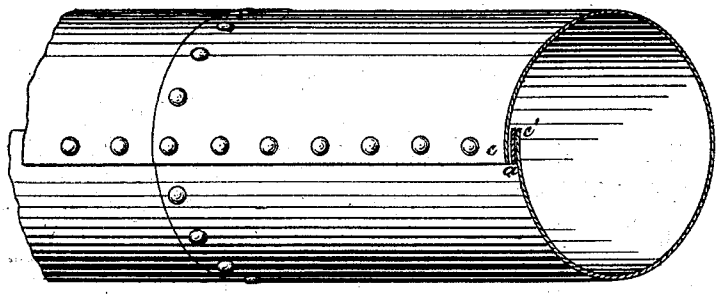

FIG. II.

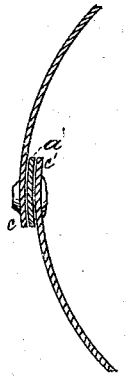

FIG. III.

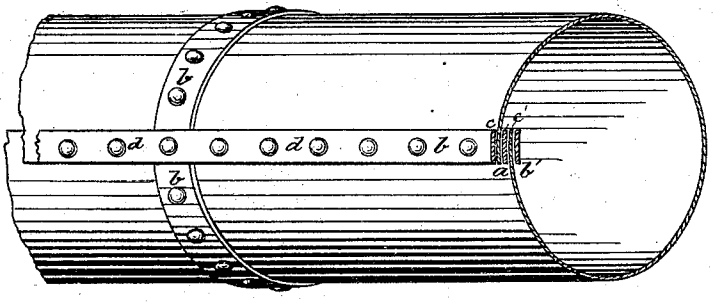

FIG. IV.

FIG. VI.

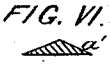

FIG. VII.

FIG. V.

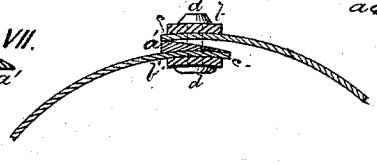

FIG. VIII.

WITNESSES.

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PHINEHAS BALL, OF WORCESTER, MASSACHUSETTS.

IMPROVEMENT IN JOINTS FOR SHEET-METAL VESSELS.

Specification forming part of Letters Patent No. **151,072**, dated May 19, 1874; application filed March 19, 1874.

To all whom it may concern:

Be it known that I, PHINEHAS BALL, of Worcester, in the county of Worcester and State of Massachusetts, have invented certain Improvements in the Modes of Riveting the Joints of Vessels Made of Sheets or Plates of Metal, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a perspective view of part of a wrought-iron pipe having my improvement applied thereto; and Fig. 2, a cross-section of the same, showing details. Fig. 3 represents a perspective view of a pipe having a modified form of my improvement applied thereto, and Fig. 4 a detail section of the same. Fig. 5 represents a detail section, similar to Fig. 4, but having the interposed strip of metal of a modified form. Figs. 6, 7, and 8 represent cross-sections of the interposed strip, being modified forms of the same.

My invention relates to a new and improved mode of forming the joints of vessels made of sheets or plates of metal, so as to make them steam and water tight; and it consists in combining, with a strip of soft metal which has been interposed between the edges of the sheets of metal about to be joined together, two other strips of metal, arranged, the one on the outside and the other on the inside of said joints, and then securing the whole together by rivets common to all; or, instead of the two latter strips, washers of suitable size and shape may be substituted, two washers for each rivet, and these so arranged as to be interposed between the heads of the rivets and the sheets of metal. By either of these plans a perfectly steam or water tight joint may be made, even when steel plates or sheet-steel are used to form the vessels.

To enable others skilled in the art to make, construct, and use my invention, I will now proceed to describe it in detail, here premising that, as my improvements are peculiarly adapted to the making of sheet-metal water-pipes, I have illustrated it in that connection; although it is equally applicable to the constructing of any kind of apparatus or vessel requiring a steam or water tight joint, such as steam-boilers, water-tanks, exhaust-pans, wrought-iron furnaces, &c.; and hence these, as such, are considered as coming within the immediate scope, purview, and protection of this patent.

By reference to the drawing it will be seen that each joint is formed by interposing a strip of soft metal, *a*, between the lapping edges *c* and *c'* of the plates about to be joined together, and then placing two other narrow strips of metal, *b b'*, the one on the outside and the other on the inside of the lapping edges *c c'*. This is shown in Figs. 3 and 4, the one strip, *b*, being on the outside, and the other, *b'*, on the inside, the strip *a* being interposed between the lapping edges *c c'* of the plates about to be joined together. Each of the strips *a*, *b*, and *b'*, and lapping edges *c* and *c'*, are pierced with holes equidistant apart, so as to coincide the one with the other, that the same rivet *d* may be common to all, and thus serve to rivet the whole firmly and tightly together. If desired, strip *a* may then be staked in and calked, that an absolutely tight joint may be made.

From what has been said, it will be seen that this plan of forming a joint by interposing a strip of soft and malleable metal can be most advantageously employed when the vessels being constructed are made of sheets or plates of steel, or of plates of other hard metal, such as hard iron; or where plate or sheet metal is riveted to cast-iron. For these purposes the strips *a* may be made of very soft and malleable iron, as, for instance, by making them of the highest refined iron, then subjecting them to the rolling process, and afterward annealing them before putting them in the joint. This mode of preparing the strips imparts to them a peculiar softness, which renders them highly serviceable for the purpose; or rolled or cast copper and brass may be most advantageously used for the same purpose, and with equal success, care being taken that they are also properly annealed before using them, as the desirable feature in all is extreme malleableness and susceptibility of compression, in order to facilitate the riveting, staking, and calking processes. Other soft metals may be used, according to the purposes the vessels made on this plan are designed to serve, or for which they are intended to be used.

With a view of facilitating the making of a tight joint by the interposition of a strip of

soft and malleable metal between the edges of the plates, I prefer to make the strip of a wedge-shaped or angular form, such as those shown in Figs. 5 and 6; or such forms may be slightly rounded, like Fig. 7, which, in effect, is but the rounded form of Fig. 6; or it may be made like a flattened ellipse, as in Fig. 8, the general idea being that prominent bearing-edges are better for forming a tight joint than a broad flat bearing-surface, as they can not only adapt themselves better to the inequalities of the plates under the riveting process, and thereby make a tighter joint, but they can be better staked in through the use of suitable tools than a thin flat strip of equal thickness possibly could be. Besides, by making the strips of a wedge-shaped form, a more evenly-rounded joint can be made than if they were of uniform thickness.

Having described my improved mode of making a steam and water tight joint in vessels or pipes made of sheets or plates of metal, what I claim is—

The combination of a strip, *a*, of soft and malleable metal, interposed between the lapping edges *c c'* of plates or sheets of metal about to be riveted together, with two other metal strips, *b b'*, or a double series of washers, arranged as described, when the whole are riveted together by means of rivets common to all, in the manner and for the purposes set forth.

PHINEHAS BALL.

Witnesses:
BENAIAH FITTS,
ABIEL E. WILSON.