

P. BALL.

Riveting Joints of Sheet-Metal.

No. 142,979.

Patented September 23, 1873.

Fig 2

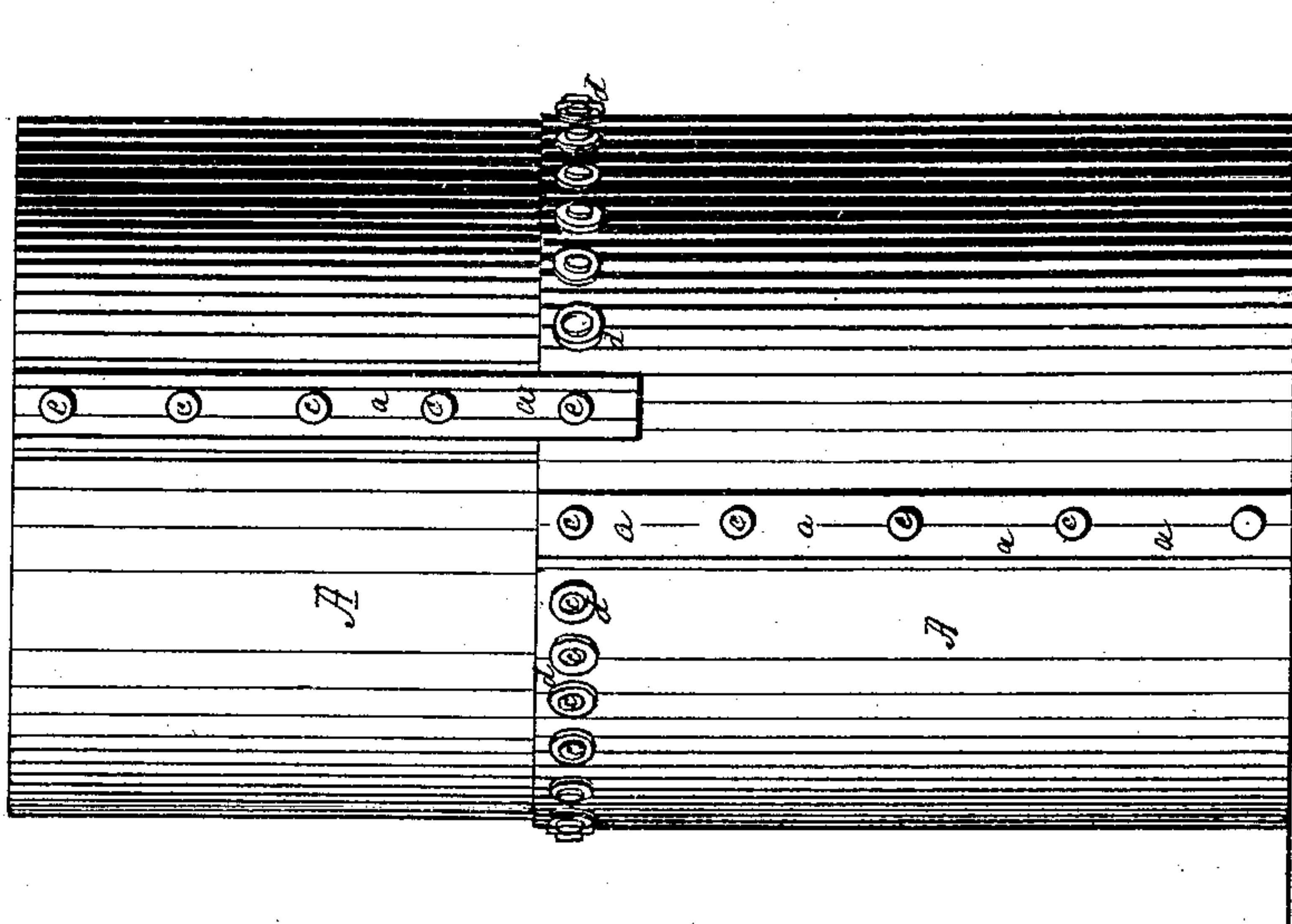
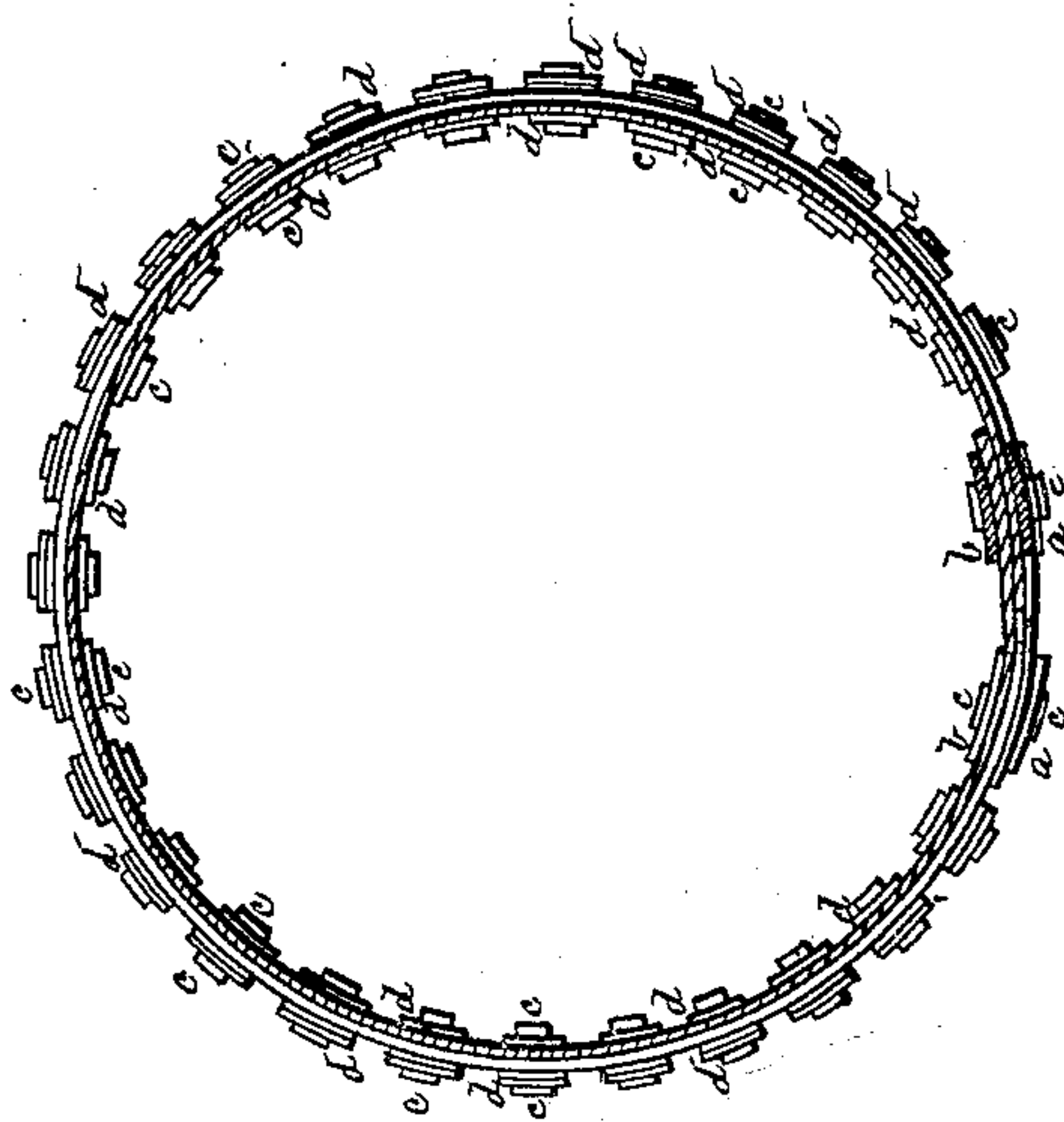


Fig 1



Witnesses,

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# UNITED STATES PATENT OFFICE.

PHINEHAS BALL, OF WORCESTER, MASSACHUSETTS.

## IMPROVEMENT IN RIVETING JOINTS OF SHEET METAL.

Specification forming part of Letters Patent No. **142,979**, dated September 23, 1873; application filed July 29, 1873.

*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 an Improved Method of Riveting Sheet-Metal Tubes, Pipes, &c., of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 represents an end view of a section of a sheet-metal pipe having my improvements applied thereto, and Fig. 2 a plan of the same.

My invention relates to a new and improved mode of riveting together the edges of thin sheets of metal, and more especially of thin sheet-metal tubes, so as to make them steam and water tight; and its nature consists in interposing on each side of the joint (where the sheets are joined together or lapped over each other) a narrow rib of metal, between the sheets and the heads of the rivets that secure them together, said ribs being provided with holes through which the rivets pass. Or, instead of using ribs of metal for this purpose, two small washers or sections of sheet metal may be used for each rivet, and which may be made of any required size or shape. Or the rivets may be made with one wide and thick head, in which case but one rib of metal for each joint would be required, or one washer for each rivet; but such is not deemed so good a plan, being more costly than the others.

To enable others skilled in the art to make, construct, and use my improvement, I will now proceed to describe it in detail, it being here exemplified in connection with the manufacture of sheet-metal tubes.

The sheet metal of which the tubes are to be formed may be made of any suitable metal or mixtures of metal; but I prefer iron, as being both cheap and strong, and which, if thought advisable, may first be galvanized or tinned, or subsequently coated with cement. Sheets of metal of the required thickness are cut into strips of the necessary width to form, when riveted, the size of tube or pipe wanted. The edges of each of these strips are provided with rivet-holes, punched in the usual manner, at regular intervals apart. Each strip is then bent around so as to lap and form a section, A, of the required tube; this done, two ribs, *a* and *b*, of thin sheet metal are then

placed along the joint made by the lapping of the edges, the one being arranged above and the other under the joint. The rivets *c* are now passed through the rivet-holes in the ribs *a* and *b*, and those punched in the lapping edges of the tubular strip A, and securely riveted thereto. For this purpose, holes are punched through the ribs *a* and *b* at points equidistant apart with the rivet-holes punched in the edges of the tubular strip A, and so as to coincide with them. By this means, a very close and strong joint is made, which is both steam and water tight. In this way each section of the pipe or tube is made; each, however, being made a little larger at one end than the other, so that in putting the sections together the small end of the one will pass into the large end of the other in order to form a lap, by means of which they may, in precisely the same way, be riveted together—that is to say, with two interposing ribs of metal running around the joint, the one on the inside and the other on the outside, and pierced with rivet-holes, which coincide with the rivet-holes punched in the end of each section, and which are also so punched as to coincide with each other, so that the rivets may pass through all three, and form, when riveted, as in the other, a strong and steam or water tight joint.

It is here, however, to be observed that in riveting the longitudinal joints of the pipes the rivet at the ends of each section A is not fastened when the section is made, but is put in and fastened subsequently when the sections are put together, and is made to pass through both connecting-sections, forming one of the series of the sectional as well as of the longitudinal joint rivets.

Instead of using continuous ribs *a* and *b*, like those shown in Fig. 2, they may be made in sections, like washers, such as those shown in the circular lap of the same figure, there being, in that case, a washer, *d*, for each rivet-head on both sides of the tube, as shown in Fig. 1; or, instead of using washers *d* or ribs *b* on the inside of the tube, each rivet may be made with a large or wide and thick head to take their place, and which may be either flat or suitably shaped on its inner face to conform to the inner surface of the tube. These wash-



ers *d* may be made of any suitable shape, size, and thickness required to suit the kind and size of pipe or tube being made; and so with the ribs, as they may be made of any suitable size, thickness, and form or shape without altering in any degree the principle of my invention.

As a rule, in making these tubes I prefer to make the longitudinal joints with ribs *a* and *b* interposed, and the sectional or circular joints with washers *d*, as shown in Fig. 2, as each, in certain respects, are, perhaps, better adapted for their respective joints, as indicated; yet I do not mean to confine myself to such a plan, as each kind may either be used singly or in connection with each other, as may be deemed best.

The addition of the metal of the ribs or washers to the joints permits the latter to be staked, headed, or drawn down in the same manner as is done in the joints of sheet metal of thicker dimensions, as in boiler and flue making.

My improvement is susceptible of being applied to many useful purposes in the arts, and to many articles manufactured of thin sheet metal; but it is particularly useful in the manufacture of sheet-metal tubes or pipes, such as those used in the construction of what is known as wrought-iron cement-lined water-pipes. These pipes, as heretofore made, have not been made water-tight in the joints by the present mode of riveting them together, dependence usually being had upon the cement lining to remedy all the defects of the riveting, as well as the spring and curling of the sheets in their manufacture, by which open joints are left in the seams—the result of which is that just enough water oozes through the joints to damage the pipe, but not enough

for the time being to occasion such a leak as would be discovered above ground, and hence the pipe is ruined before it is known that it was in danger.

This defect my invention remedies, as it enables the manufacturers of this kind of water-pipe to test it in a hydraulic press before laying it down, as is done with cast-iron pipes. It also greatly improves the strength of the joint, for the compression of the riveted ribs or washers on the thin sheets of metal of which the pipe is made exerts such a hold upon them as to make the joints the strongest portions of the pipe or vessel so constructed; whereas, by the ordinary mode of riveting only about one-half of the strength of the iron is retained at the joints.

Pipes or tubes so made, when intended to be used in wet or damp places, may be covered on the outside and lined on the inside with hydraulic cement in the usual manner, after which they are then ready for use wherever required. This coating prevents them from becoming oxidized or rusted, and will preserve them for a great length of time in perfect condition.

Having described my invention, what I claim as new is—

The mode herein described of forming a steam or water tight joint between the overlapping edges of thin sheets of metal, as applied to the manufacture of water pipes, tubes, or other articles of manufacture—that is to say, by riveting ribs or washers over the laps or joints—in the manner substantially as shown and described.

PHINEHAS BALL.

Witnesses:

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D. G. STUART.