

E. PANKHURST & A. C. BISBEE.  
CORRUGATED METAL CULVERT.  
APPLICATION FILED NOV. 4, 1908.

944,985.

Patented Dec. 28, 1909.

Fig. 1.

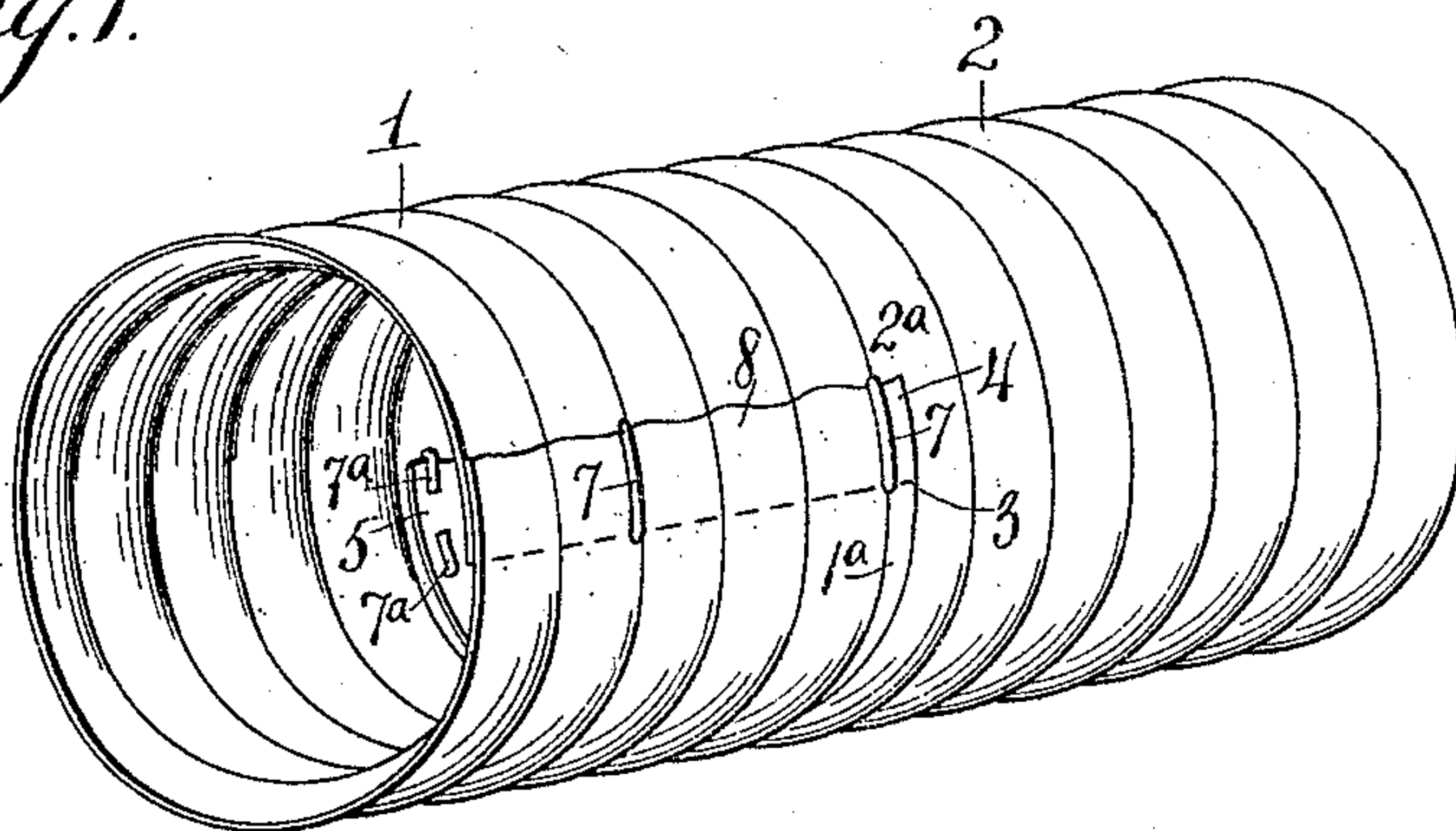


Fig. 2.

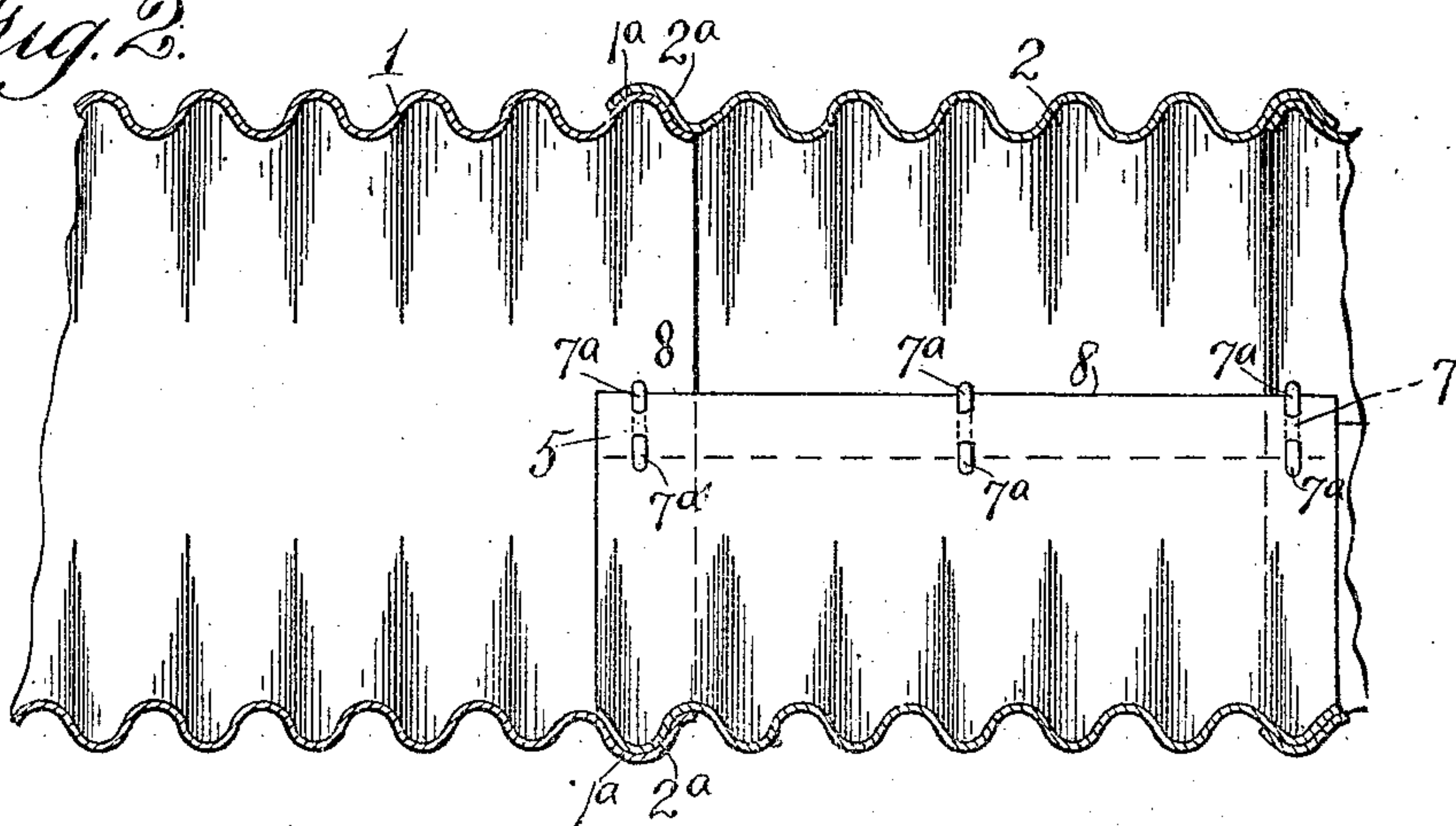
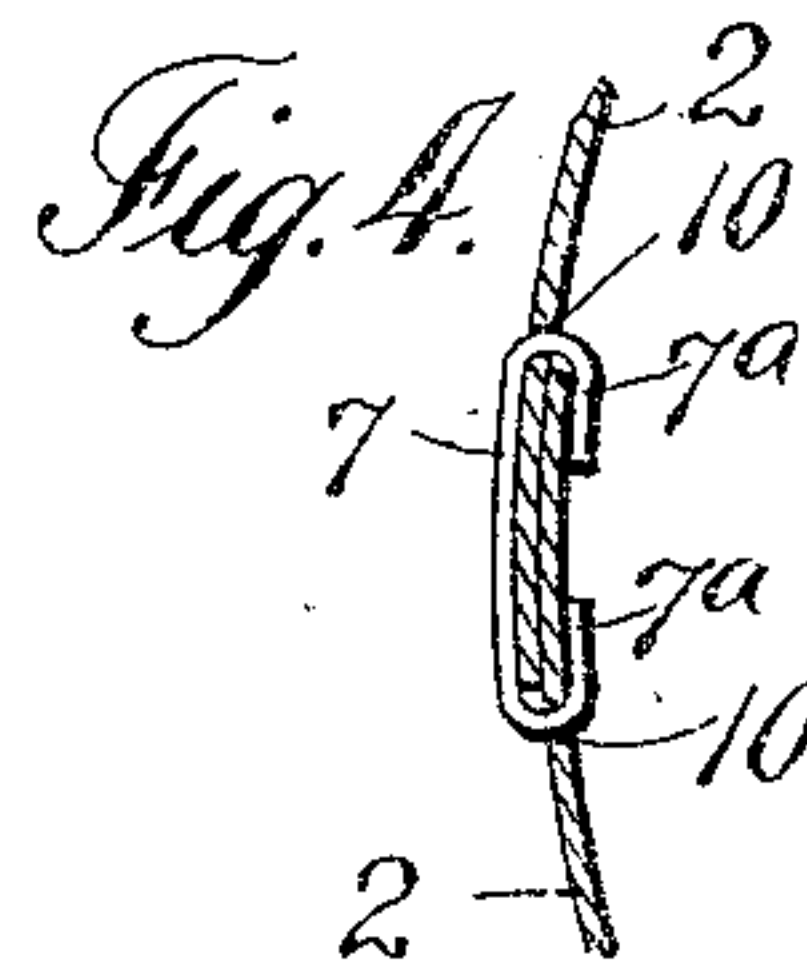
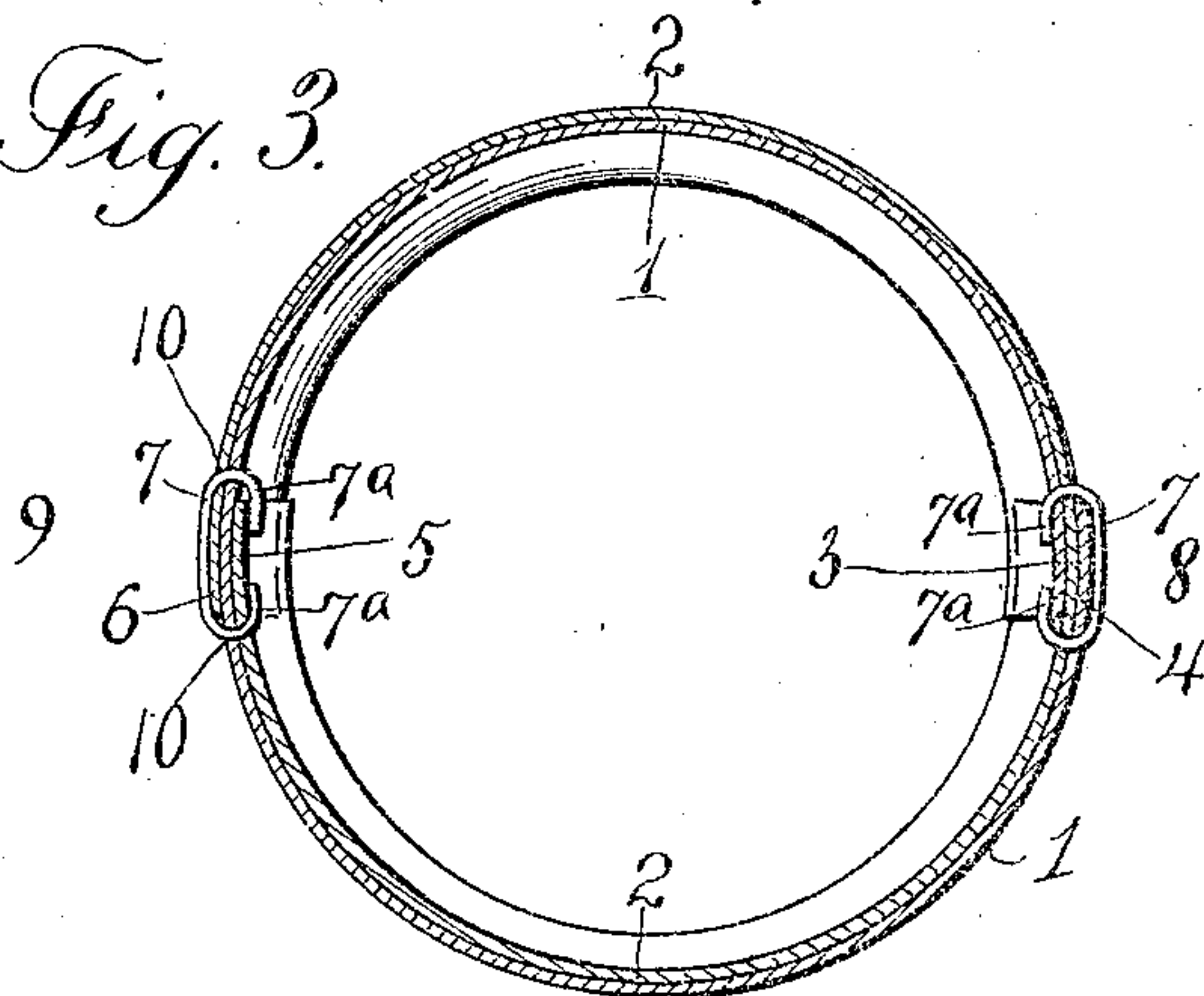


Fig. 3.



Witnesses  
W. E. Allen  
E. B. Clark

By

Inventors  
Ephraim Pankhurst  
Allen Clark Bisbee  
C. Page Jones  
Attorney



# UNITED STATES PATENT OFFICE.

EPHRAIM PANKHURST AND ALLEN CLARK BISBEE, OF LYLE, MINNESOTA.

CORRUGATED-METAL CULVERT.

944,985.

Specification of Letters Patent.

Patented Dec. 28, 1909.

Application filed November 4, 1908. Serial No. 460,993.

*To all whom it may concern:*

Be it known that we, EPHRAIM PANKHURST and ALLEN CLARK BISBEE, citizens of the United States, residing at Lyle, in the county of Mower and State of Minnesota, have invented certain new and useful Improvements in Corrugated-Metal Culverts, of which the following is a specification.

This invention relates to culverts and drains, and more particularly to metallic culverts composed of corrugated sections secured together at their overlapping ends, the end corrugation of one section overlapping the end corrugation of the adjacent section and being secured by a staple fastening device.

The object of our invention is to provide a metal culvert or drain pipe of increased strength at the joints, free from internal obstructions and with fastening devices which are much stronger than rivets and arranged to fasten down both of the overlapping edges, one inside and the other outside of the adjacent section.

Another object of our invention is to provide for constructing a culvert with part of the circumference at the end of one section outside, and the other part of the circumference inside, of the end of the adjacent section, and with fastening staples at the overlapping edges at suitable points in the circumference for making lap seams of the adjacent sections in different longitudinal lines and producing joints of increased strength.

The matter constituting our invention will be defined in the claims.

We will now describe the details of construction, pointing out our improvements, by reference to the accompanying drawing, in which—

Figure 1 represents a perspective view of two connected culvert sections, embodying our improvements. Fig. 2 represents a longitudinal section of the same. Fig. 3 represents a transverse section of the culvert through the circumferential joint. Fig. 4 represents a detail view on a large scale, showing a joint at the overlapping edges of adjacent sections.

The sections 1 and 2 may be made of corrugated metal in which the circumferential corrugations extend throughout the length of each section, or in which each section is corrugated only at its ends where they overlap. We prefer, however, to use uniformly

corrugated sections as shown in Figs. 1 and 2. A distinguishing feature of our construction is that the longitudinal lap seam in one section is placed substantially at one half of the circumference around from the longitudinal lap seam of the adjacent section, and with one half of the circumference of section 1 overlapping externally at the end upon one half of the circumference of section 2, while the other circumferential half of section 2 overlaps externally the remaining half of section 1. The term section herein refers to a tubular portion of a pipe or culvert.

The end corrugations 1<sup>a</sup> will overlap the end corrugations 2<sup>a</sup> about one and one half corrugations. With the arrangement above indicated the overlapping end corners 3 and 4 of section 1 at the longitudinal lap seam 8 will be joined to section 2 by our staple fastener 7. Holes or slots 10 are punched through the metal of sections 1 and 2 just at the points where the edges of the metal at corners 4 and 5 terminate, as shown in Fig. 3, and into these holes or slots are inserted the ends 7<sup>a</sup> of staple 7 and such ends then turned down and clenched, thereby engaging the adjacent sections and fastening down the edges of the overlapping parts, as clearly shown in Figs. 3 and 4. This operation is readily performed by machinery and makes a stronger fastening than bolts or rivets, since by the one device the parts are secured at two points, and in addition the edges of the overlaps are secured in place. Our staple fastener gives twice the bearing that a single rivet or bolt would give and makes a much stronger joint than could be made by rivets or bolts. The operation of putting in the staple fasteners and turning down the ends so as to clench the edges can be performed more rapidly by a suitable machine than can be performed the operation of securing the parts with bolts or rivets.

It will be noted, by reference to Figs. 1 and 3, that the overlapping corners at lap seam 8, of section 1, are secured by the staple fastener 7, to the adjacent overlapping end of section 2, the corner 3 being inside of section 2 and the corner 4 outside of section 2; also that on the opposite side the overlapping corners 5 and 6 at lap joint 9, of section 2, are similarly connected to the end of section 1. By this construction one half of the circumference of the section 1 will be



located inside of a corresponding half of section 2 while the other half of section 1 will be located outside of the corresponding half of section 2. This construction makes  
 5 a culvert of the same size throughout its length and the sections being secured together by our staple fastening device, the culvert is practically water tight. The longitudinal lap seams 8 and 9 may also be se-  
 10 cured by our staple fasteners 7 in substantially the same manner as above described and illustrated in Fig. 4, except that the staples will be passed through only one thick-  
 15 ness of metal and the ends turned over so as to clench the edges. Any desired number will be used for making the seams tight and rigid.

Various changes in the form, proportion, and the minor details of construction may  
 20 be resorted to without departing from the spirit or sacrificing any of the advantages of this invention.

As shown and above described, each tubular pipe, or culvert, section is composed of  
 25 a single piece or sheet of corrugated metal, and the longitudinal lap seams 8 and 9 are placed approximately on opposite sides, of adjacent sections.

Having described our invention, what we  
 30 claim and desire to secure by Letters Patent, is—

1. A culvert composed of corrugated metallic sections, having the adjacent end corrugations overlapping one another and staple fastening devices having their ends inserted in openings at the overlapping edges  
 35 of adjacent sections and turned over the edges to clench the same and hold the parts together, substantially as described.

40 2. In a culvert or drain pipe, the combination with corrugated sections overlapping one another at the end corrugations, with one edge of the lap seam inside of an adjacent section and the other edge of the lap  
 45 seam outside of said adjacent section, and a staple fastening device inserted in openings at the overlapping edges of one section and through the adjacent section, and having their ends turned over each edge of the

lap seam to clench the same and hold the  
 adjacent sections together, substantially as described. 50

3. A culvert or drain pipe composed of tubular sections, each section being made of a single piece of sheet metal with a single  
 55 longitudinal lap-seam and unnotched end corrugations, which are overlapped, with the circumferential half of the first section exterior to, and the other circumferential  
 half interior to, corresponding portions of  
 60 the end of an adjacent section, and the longitudinal lap-seams of adjacent sections turned a half arc one from the other, and fastening devices connecting the thus over-  
 lapped ends at the corners of the opposite  
 65 longitudinal lap-seams, thereby making all closed lap-joints, substantially as described.

4. A culvert or drain pipe composed of tubular sections, each section being made  
 70 of a single sheet of corrugated metal with a single longitudinal lap seam, the sections overlapping at the ends, the end of one section being overlapped partly inside of, and partly outside of the end of the adjacent sec-  
 75 tion, and the longitudinal lap-seams in adjacent sections arranged in different longitudinal lines, and staple fastening devices inserted in openings at the overlapping edges at the  
 ends and at the lap-seams and having their  
 80 ends turned over for clenching the edges and holding the parts together, substantially as described.

5. In a culvert or drain pipe, the combination with sections overlapping at the end  
 85 and having longitudinal lap seams, of staple fastening devices inserted through openings at the edges of the joints or seams, and having their ends turned over said edges to fasten them down and hold the parts together,  
 90 substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

EPHRAIM PANKHURST.  
 ALLEN CLARK BISBEE.

Witnesses:

O. J. TIMMONS,  
 JNO. L. GULDEN.