W. M. LANA.

CORRUGATED SHEET METAL CULVERT.

APPLICATION FILED FEB. 14, 1908.

950,928. Patented Mar. 1, 1910.

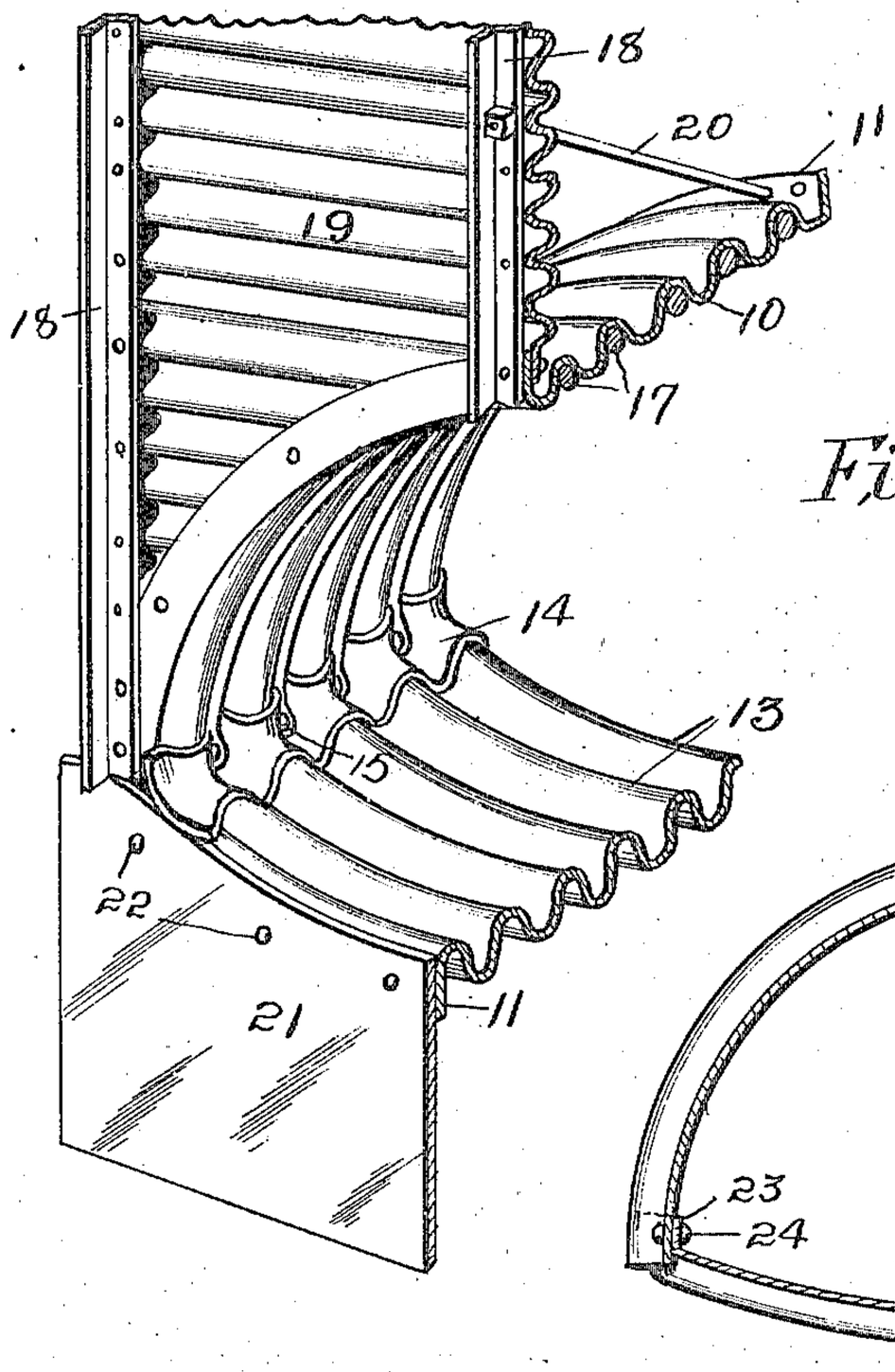

Fig. 1.

Fig. 3.

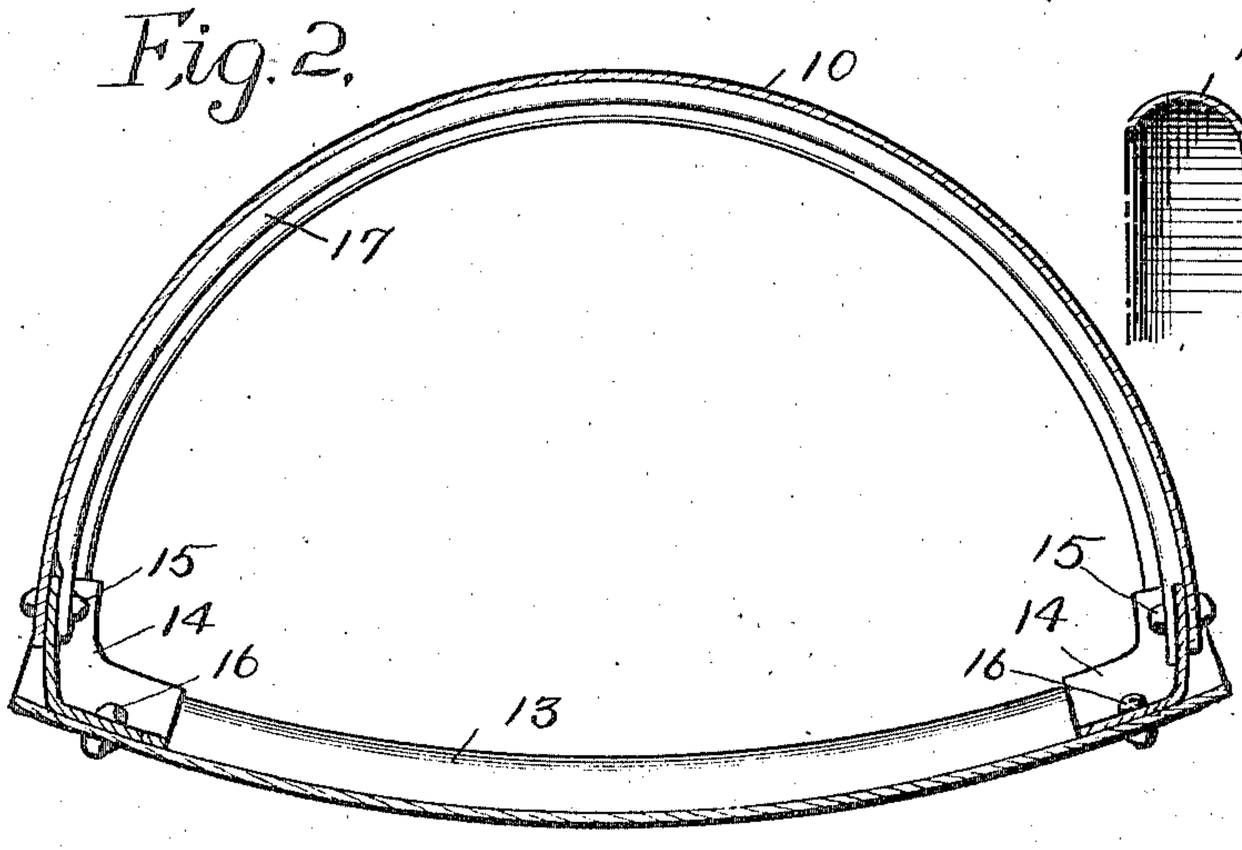

Fig. 2.

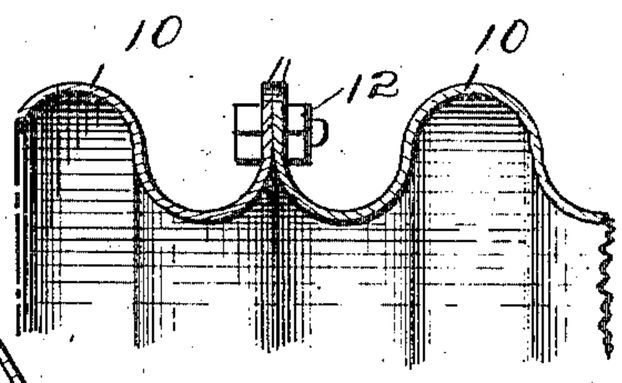

Fig. 4.

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WILLIAM M. LANA, OF HARLAN, IOWA.

CORRUGATED SHEET-METAL CULVERT.

950,928. Specification of Letters Patent. Patented Mar. 1, 1910.

Application filed February 14, 1908. Serial No. 415,950.

To all whom it may concern:

Be it known that I, WILLIAM M. LANA, a citizen of the United States, residing at Harlan, in the county of Shelby and State of Iowa, have invented a new and useful Corrugated Sheet-Metal Culvert, of which the following is a specification.

My object is to provide a corrugated sheet metal culvert of simple, durable and inexpensive construction, in which the top portion of the culvert is formed of a substantially semi-circular arch, and the bottom portion is formed with a comparatively slight downward curvature along its longitudinal center, said parts being detachably connected so that a number of upper sections may be nested together, to be shipped and a number of lower sections may also be nested together for shipping, to thereby occupy a minimum of space, and be easily handled, shipped and stored.

A further object is to provide improved means for connecting together the adjacent ends of corrugated sheet metal culverts.

A further object is to provide improved means for connecting together the upper and lower culvert sections.

A further object is to provide reinforcing rods for the upper member of a culvert, to thereby strengthen and brace said upper section in cases where the culvert is made of comparatively large diameter, and consists of comparatively thin sheet metal, which would not of itself bear the load likely to be placed on it.

A further object is to provide an improved end plate for culvert sections.

My invention consists in the construction, arrangement and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which—

Figure 1 shows a detail sectional perspective view of a part of a reinforced sheet metal corrugated culvert embodying my invention, and provided with an end plate connected thereto. Fig. 2 shows a transverse sectional view of a sheet metal culvert embodying my invention. Fig. 3 is a similar view on a reduced scale, showing a modification, and Fig. 4 shows an enlarged detail sectional view illustrating the means for connecting together two culvert sections.

Referring to the accompanying drawings, the upper culvert section is formed of sheet metal, and is provided with transverse corrugations throughout its length. The corrugations are indicated by the numeral 10, and at the ends of the culvert I have formed the flanges 11 that extend outwardly at right angles to the longitudinal axis of the culvert, as clearly shown in Fig. 4. In order to provide for connecting the ends of two adjacent culverts together, I extend bolts 12, or other suitable fastening devices, through said flanges. Obviously, this may easily be done, because both sides of the flanges are accessible to the operator, and holes may be punched to receive the bolts or other fastening devices.

The lower culvert section is also made of sheet metal, and provided with mating corrugations. Such lower section, however, is arranged on a much greater curvature than the upper section, and its central portion extends only a slight distance below a line drawn through its end portions. The corrugations in the lower section are indicated by the numeral 13, and the said lower section is preferably made wide enough to permit the ends of the upper section to rest upon the tops of the corrugations in said lower section, as clearly shown in Fig. 2. Obviously, by forming the upper and lower sections in separate pieces, a large number of upper sections may be nested together for shipping and storing, and a similar number of lower sections may be similarly arranged.

In order to provide water tight joints at the intersection of the upper and lower sections, I have provided connecting strips 14. These are also made of corrugated sheet metal, the corrugations being arranged to accurately fit over the corrugations in both the upper and lower sections, as clearly shown in Fig. 1. Then the connecting pieces and culvert sections are firmly held together by means of rivets 15 passed through the connecting pieces and the upper sections, and rivets 16 passed through the connecting pieces and the lower sections. Obviously, a culvert constructed in this manner has a maximum strength, with a minimum amount of material.

In some instances, it is desirable to make culvert sections of comparatively large diameter, out of comparatively thin sheet metal, and in order to do this, and to make the culvert strong enough to withstand pres-

sure from above, to which they are frequently subjected, I have provided reinforcing rods for the sections. These rods are indicated by the numeral 17, and are provided with loops at their ends through which the rivets 15 are passed. The rods themselves lie wholly within the corrugations of the upper section, and hence are held by said corrugations against lateral movement in either direction, so that no other fastening need be provided for them, than the rivets at the ends, and yet the full strength of the reinforcing rods will be available against crushing strains from above on the culvert, and the said rods are connected with the culvert at the point where the culvert is strongly reinforced by the connecting strips 14. I have also provided a retaining wall for the end of the culvert, which retaining wall comprises a frame 18 of structural steel, and a body portion 19 of corrugated sheet metal connected with the frame. This retaining wall is then riveted to the end of the culvert and is held in proper position with relation thereto, by means of brace rods of the kind indicated by the numeral 20, and shown in Fig. 1. I have also provided an apron to be connected to the lower culvert section at the discharge end thereof. This apron is indicated by the numeral 21, and is connected by rivets 22 with the flange 11 at the end of the lower section. One of the advantages attained by the use of a culvert having its bottom section arranged on a comparatively great curvature, and its top section on a materially less curvature, is that the culvert is made wider at a point a short distance above its bottom, and hence, obstructions that enter the culvert are less likely to remain therein, and such obstructions may be more easily washed out when the culvert is flushed, than would be the case with round or square culverts. Furthermore, a culvert of this kind may be seated more firmly in the ground, and be less likely to be moved by settling or washing out of the ground around the culvert.

In the modified form shown in Fig. 3, I have dispensed with the use of connecting pieces 14, and have formed on the ends of the lower section upwardly inclined corrugated portions 23 designed to fit into the corrugations of the upper section, and firmly held to the upper section by means of rivets 24. In this way, I dispense with the use of the extra connecting strips 14, and I preferably employ this form of connecting the upper and lower sections together when constructing culverts of comparatively small size.

Having thus described my invention, what I claim and desire to secure by Letters Patent, is—

1. A culvert comprising an upper sheet metal section substantially semi-circular in cross section, and a lower sheet metal section having a slight downward curvature at its central portion, and means for connecting the adjacent edges of said upper and lower sections together.

2. A culvert comprising an upper sheet metal section formed with transverse corrugations and substantially semi-circular in cross section, and a lower sheet metal section formed with transverse corrugations and having a comparatively slight downward curvature at its central portion, the adjacent edges of both sections having their corrugations arranged to fit into each other, and means for securing said adjacent edges together.

3. A culvert comprising an upper sheet metal culvert section having transverse corrugations, and substantially semi-circular in cross section, a lower sheet metal culvert section having transverse corrugations, and having a slight downward curvature at its central portion, and connecting strips having corrugations formed therein designed to fit into the corrugations of both the upper and lower sections, and means for securing said connecting strips to both sections.

4. A culvert comprising a sheet metal body portion having transverse corrugations formed therein, and a series of reinforcing rods secured to the body portion and mounted in the corrugations therein, in such a manner that the corrugated structure will prevent tilting movements of the reinforcing rods.

5. A culvert comprising an upper sheet metal section having transverse corrugations and substantially semi-circular in cross section, a lower sheet metal section having similar transverse corrugations, the edges of the upper section being designed to rest upon the edges of the lower section, connecting strips having corrugations designed to fit into the corrugations of both sections, rivets for connecting the strips with both sections, and reinforcing rods having their ends connected with said rivets and their central portions contained within the corrugations of the upper section.

6. A culvert comprising an upper sheet metal section formed with transverse corrugations and substantially semi-circular in cross-section, a lower sheet metal section formed with transverse corrugations and having a slight downward curvature at its central portion, and means for connecting the adjacent edges of said upper and lower sections together.

7. The combination with a sheet metal culvert section having its end flared outwardly substantially at right angles to its longitudinal axis, of a sheet metal apron placed adjacent to said flared edge, and rivets connecting the apron and the flared edge.

8. The combination with a sheet metal cul-

vert section of a metal frame, a corrugated sheet metal retaining wall supported by said frame, said parts being connected to the culvert section.

9. The combination with a sheet metal culvert section, of a metal frame, a corrugated sheet metal retaining wall supported by said frame, said frame and said corrugated retaining wall being both secured by rivets to the culvert section, and supporting rods connected to the frame and to the culvert section.

10. A culvert comprising an upper sheet-metal section substantially semi-circular in cross-section having its ends flared outward substantially at right angles to the longitudinal axis, a lower sheet metal section having a slight downward curvature at its central portion and also having its ends flared outward substantially at right angles to the longitudinal axis, and means for connecting the adjacent edges of said upper and lower sections together.

11. A culvert comprising an upper sheet metal section substantially semi-circular in cross-section formed with transverse corrugations and having its ends flared outward substantially at right angles to the longitudinal axis, a lower sheet metal section formed with transverse corrugations and having a slight downward curvature at its central portion and also having its ends flared outward substantially at right angles to the longitudinal axis, and means for connecting the adjacent edges of said upper and lower sections together.

12. The combination of two culvert lengths arranged end to end and respectively comprising an upper sheet metal section substantially semi-circular in cross-section formed with transverse corrugations and having its end adjacent to the end of the other culvert length flared outward substantially at a right angle to the longitudinal axis, a lower sheet metal section formed with transverse corrugations and having a slight downward curvature at its central portion and also having its end adjacent to the end of the other culvert length flared outward substantially at a right angle to the longitudinal axis, means for connecting the adjacent edges of said upper and lower sections together, and means such as bolts for connecting said flared ends of the culvert lengths together.

Des Moines, Iowa, Feb. 4, 1908.

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Witnesses:

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P. JESSEN.