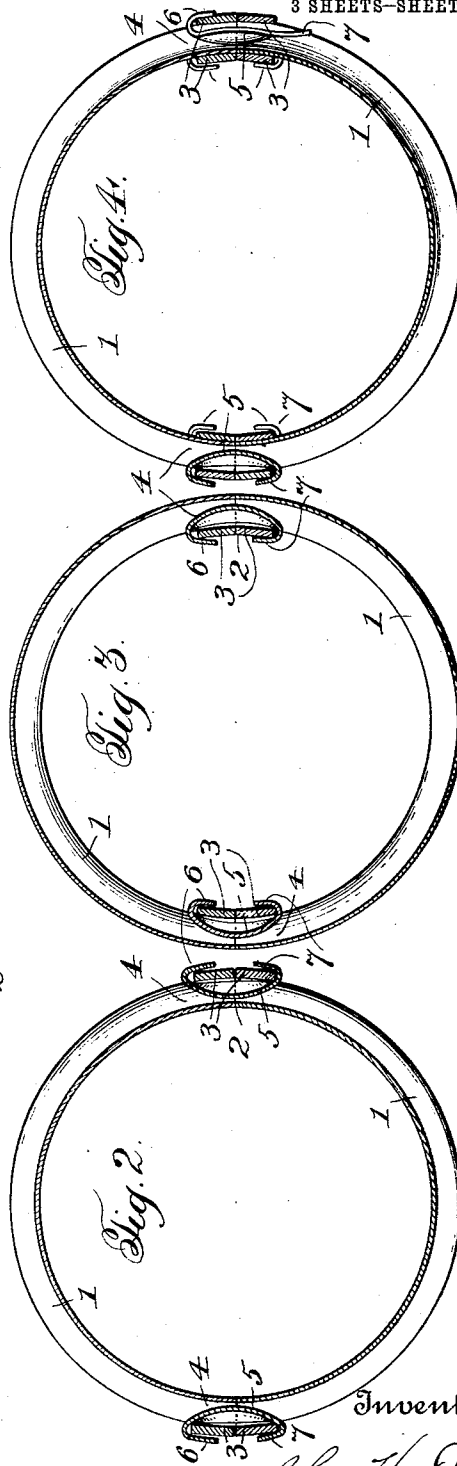
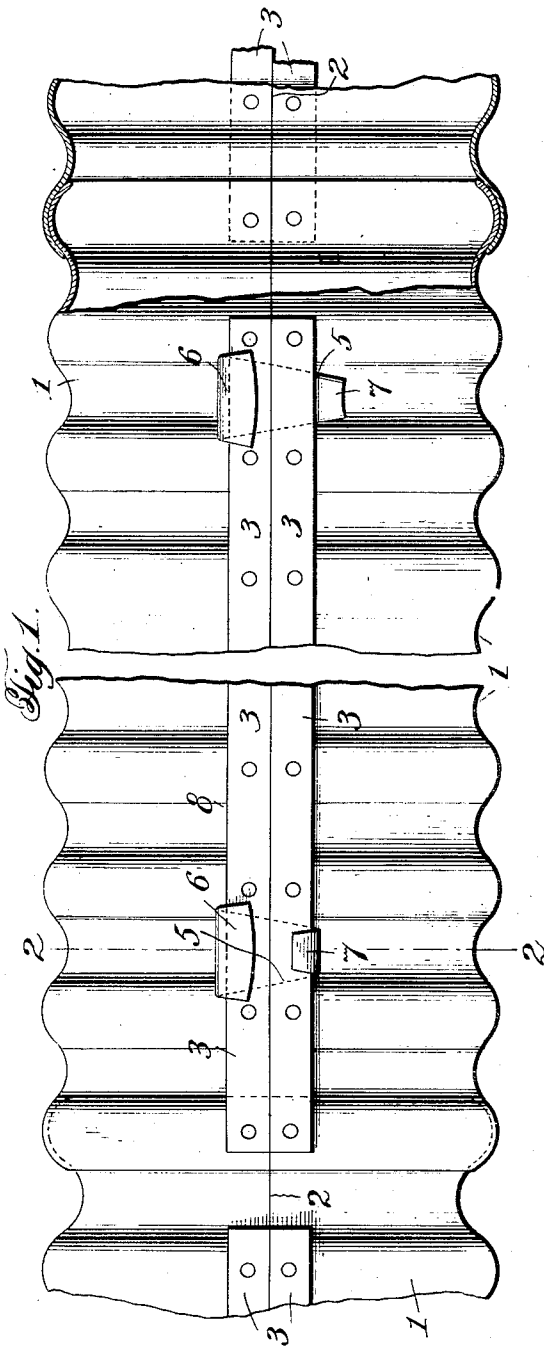


J. H. DEAN.
SHEET METAL CULVERT.
APPLICATION FILED APR. 22, 1912.

1,049,816.

Patented Jan. 7, 1913.

3 SHEETS—SHEET 1.



Witnesses:

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Emma H. Buck.

Inventor:

By *John H. Dean*
J. H. Hutchinson & Attorney:

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3 SHEETS—SHEET 2.

Fig. 5.

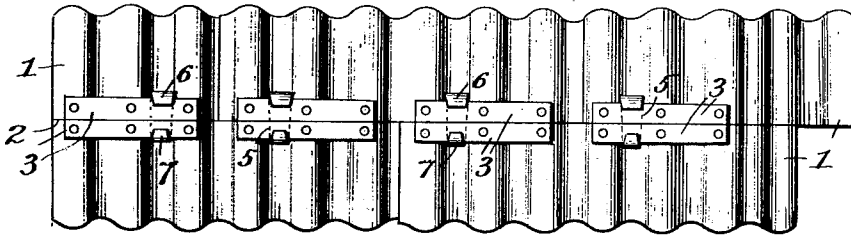


Fig. 6.

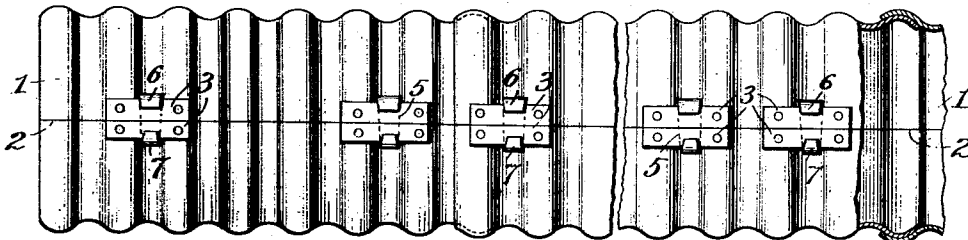
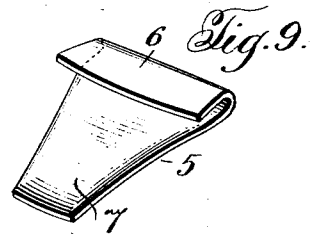
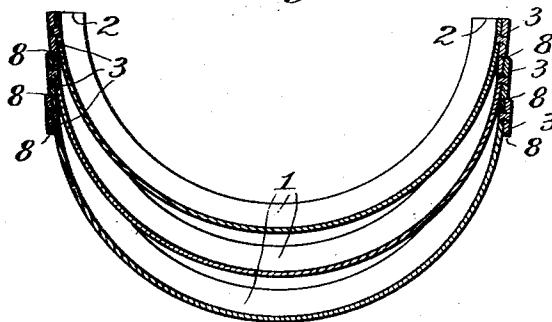


Fig. 8.



Fig. 7.



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3 SHEETS—SHEET 3.

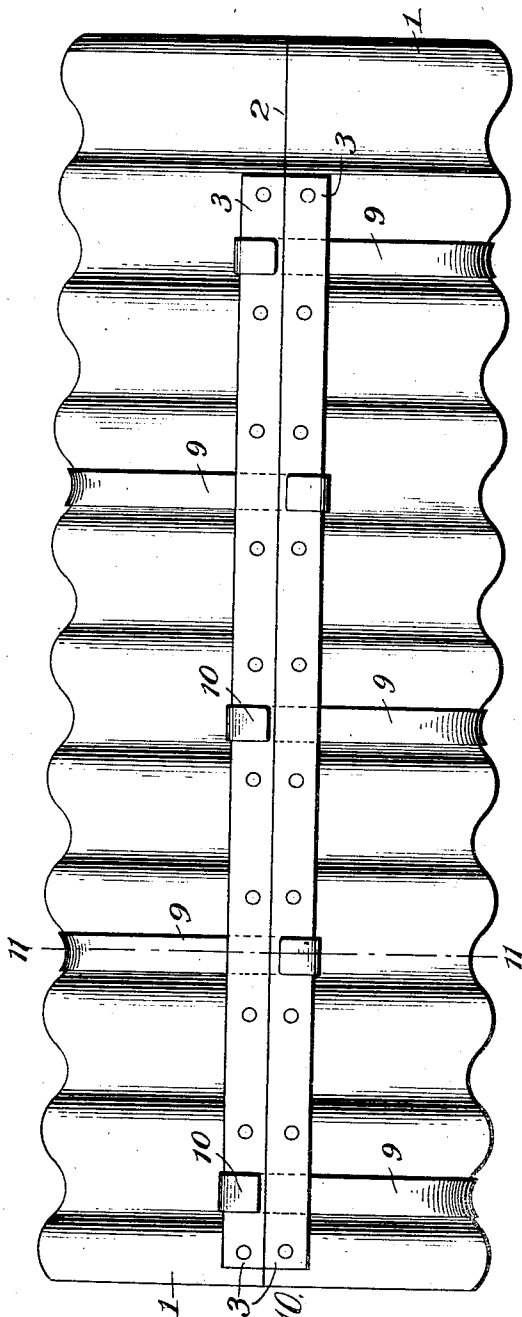


Fig. 10.

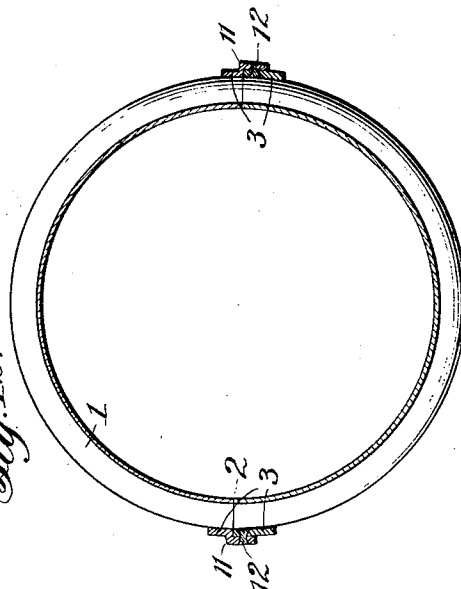


Fig. 12.

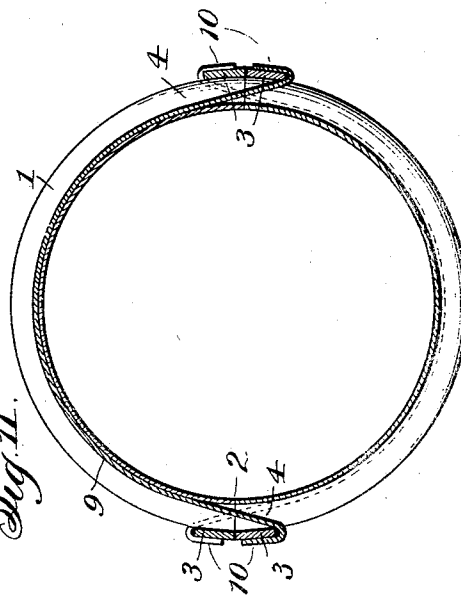


Fig. 11.

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UNITED STATES PATENT OFFICE.

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SHEET-METAL CULVERT.

1,049,816.

Specification of Letters Patent.

Patented Jan. 7, 1913.

Application filed April 22, 1912. Serial No. 692,326.

To all whom it may concern:

Be it known that I, JOHN H. DEAN, a citizen of the United States, residing at Birmingham, in the county of Jefferson and State of Alabama, have invented certain new and useful Improvements in Sheet-Metal Culverts, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to sheet metal culverts or pipes to be used as drains, aqueducts or the like, and more particularly to such culverts of the nestable type, wherein the same are built of sections adapted to be knocked down and nested together in shipment and storage and to be set up and formed into a complete culvert or pipe at the place where the same is to be used.

The principal object of the invention is to generally improve the construction of such culverts and to provide a culvert which is strong and rigid in construction, cheaply made, and requiring a comparatively small amount of labor in assembling the culvert sections to form the completed culvert.

A further object of the invention is to provide a culvert which is made up of corrugated metal sections, preferably half sections, said sections having rigid metal strips or bars welded or riveted to the same at or near their longitudinal edges, so that when the sections are placed together with their longitudinal edges meeting, adjacent strips or bars serve as a means to which sheet metal clips, keys or other fastening devices may be applied for holding said adjacent strips in fixed relation one with the other and thereby retaining said sections in assembled relation. In connection with this object of the invention, it is to be noted that the rigid strips or bars are connected directly to the convex corrugations of the culvert sections, in which event they also serve to materially strengthen the sections.

A still further object of the invention is to provide a culvert of the type set forth, wherein the sections thereof are particularly adapted for nesting one within the other

while being shipped or in storage, and furthermore wherein said sections may be easily connected together without the use of bolts, rivets or similar fastening devices, which obviates any punching or breaking away of the metal from which the culvert sections are made, thereby prolonging the life of the culvert.

Further objects and advantages will appear in the following description, it being understood that various changes in form, proportions and minor details of construction may be resorted to within the scope of the appended claims.

I have illustrated my invention in the accompanying drawings, in which:—

Figure 1 is a side elevation of a culvert showing the sections of the same constructed in accordance with my invention and in connected relation one with the other, a portion of the view being shown in cross-section to illustrate the overlapping ends of longitudinally adjacent sections; Fig. 2 is a transverse sectional view of the culvert taken on the line 2—2 of Fig. 1; Fig. 3 is a similar view of a modified form of the invention, showing the metal strips and fastening keys or clips arranged upon the inside of the culvert sections; Fig. 4 is a similar view of a still further modification of the invention showing the metal strips and fastening keys or clips secured to the culvert sections upon both the outside and inside thereof; Fig. 5 is a side elevation, on a smaller scale, of a culvert formed from sections embodying my invention, and showing the joints between longitudinally adjacent sections alternating, and also showing a modified form of the metal connecting strip, the same being shown in sections arranged at intervals along the longitudinal edges of each section; Fig. 6 is a side elevation of a culvert illustrating longitudinally adjacent sections connected together with uniform joints, and also showing the connecting strips along the longitudinal edges of said sections made up of short sections and arranged at intervals somewhat simi-

lar to that shown in Fig. 5; Fig. 7 is a view, partly in cross-section, of a number of culvert sections in nested relation one with the other; Fig. 8 is a side elevation of one of the keys or clips for fastening complementary sections together; Fig. 9 is a perspective view of the same; Fig. 10 is a side elevation of complementary sections showing straps or connecting bands engaging the metal strips or rods for securing the sections together; Fig. 11 is a transverse sectional view of the culvert shown in Fig. 10 taken on the line 11—11, thereof, and Fig. 12 is a transverse sectional view of a modified form of the invention showing the metal strips or bars of complementary sections overlapping and connected together by bolts or rivets.

Referring to the drawings, it is to be noted that each section, indicated at 1, of the metal culvert is provided with corrugations which are arranged parallel with opposite ends thereof, and that when these sections, which are preferably half sections, are arranged in assembled position to form the completed culvert, the corrugations of upper and lower sections coincide with each other, or in other words each convex and concave corrugation of an upper section is directly in line with the convex and concave corrugations respectively of the section below it. The sections 1, as has been stated, are preferably half sections, and the same are constructed without the usual outstanding flanges, but the longitudinal edges of complementary sections are adapted to abut as indicated at 2, so that when said sections are connected together with their longitudinal edges meeting or abutting, suitable improved means to be hereinafter described being provided for retaining them in such connected relation, the corrugated culvert, for all intents and purposes, has the appearance and strength of an integral corrugated cylinder. The culvert sections are provided along their longitudinal edges with rigid metal strips or bars 3, which are secured to the convex corrugations of each section preferably by welding or riveting the same thereto. In the preferred embodiment of my invention these strips 3 are continuous strips running substantially the entire length of each section, it being noted, however, that they stop short of at least one corrugation on one end of each section to permit the overlapping of the meeting ends of longitudinally adjacent sections. These strips being formed from a rigid and straight piece of metal, and the same being attached only to the convex corrugations of each section, it will be obvious that said strips serve to greatly strengthen the sections and retain them in proper shape. The strips 3, however, may be made of short sections arranged

at intervals along the longitudinal edges of the culvert sections, as clearly shown in Figs. 5 and 6 or the drawings.

In assembling the sections of this culvert with the longitudinal edges of upper and lower sections abutting, the metal strips or bars 3 of complementary sections are arranged to lie adjacent one another, and in this relation and when the same are fastened or tied together, serve as a means for retaining the sections in connected relation for forming the completed culvert. These adjacent strips of complementary sections, as before referred to, are connected to the convex corrugations of the sections, and are preferably arranged upon the outside of said sections, and it will be noted that passage-ways as indicated at 4 are formed between the corrugated culvert sections and the said metal strips at points intermediate the convex corrugations of said sections, and these passage-ways serve to receive sheet metal clips or keys 5 which are provided for fastening adjacent strips together for the purpose of holding the sections in connected relation. The keys or clips 5 are bent over the strips as clearly shown in the drawings, and as will be obvious, serve as a tie or clamping means for said strips and for the purpose just referred to. It is to be understood that any form of sheet metal clip or key may be used for fastening these strips together, although the preferred form of fastening means is shown in Figs. 8 and 9 of the drawings, wherein it will be noted that the key or clip here shown is transversely curved intermediate its ends to conform to the curvature of the concave corrugations of the sections so as to neatly fit within the passage-ways 4 as above specified. These keys or clips are also wedge-shaped as shown, and are also constructed for their desired use prior to being applied to the strips, with a downwardly bent end portion 6, which as will be obvious, serves as the engaging means for one of the strips, preferably the strip of the upper half section, so that all that is necessary in applying these clips to the connecting strips for fastening them together, is to insert said clip within the passage-way 4 with its downwardly bent end 6 in firm engagement with one of the strips, and then bending the opposite end 7 of said clip into firm engagement with the adjacent strip. These clips or keys, it has been found, are particularly adapted when inserted within the passage-ways formed between the culvert sections and the metal strips, to serve as a means for correctly positioning the longitudinal meeting edges of complementary sections, so that said complementary sections are properly positioned before the final bend is given to the clips for fastening the sections together.

While it is the preferred embodiment of this invention to arrange the metal strips 3 and necessarily their fastening clips 5 upon the outside of the culvert sections, as shown in Fig. 2, it is to be understood that these strips and fastening clips may be arranged upon the inside of said sections, as clearly shown in Fig. 3 of the drawings, and also that if found desirable these strips and fastening clips may be arranged on both the outside and inside of said sections as clearly shown in Fig. 4.

The particular purpose of the metal strips, as before mentioned, is to provide a connecting means between complementary culvert sections, but these strips also serve as a means for supporting the sections in nested relation. In this connection it will be noted upon referring to Fig. 7 of the drawings, that when the sections are in nested relation the inner longitudinal edge 8 of each metal strip rests upon the longitudinal edge of the section below it, thereby allowing the sections to be neatly nested and supported one within the other.

In the modified form of the invention shown in Fig. 10 of the drawings, complementary sections are connected together by means of straps or connecting bands 9, which bands are adapted to straddle one of the complementary sections at a point intermediate adjacent convex corrugations of the section, and the ends 10 of said straps or connecting bands are then passed through the passage-ways 4, referred to herein, and connected to the metal strips of the adjacent complementary section by bending said ends over the strips as clearly shown in the drawings. It is to be here noted that complementary sections in this form of the invention, as is true of the preferred form of the invention, are connected together at points intermediate the convex corrugations of the sections, and this is rendered possible by reason of the fact that the metal strips which are connected to the longitudinal edges of said sections are only connected to the convex corrugations thereof so as to leave passage-ways between the sections and the metal strips at points intermediate the convex corrugations.

With reference to the modified form of the invention shown in Fig. 12 of the drawings, the longitudinal metal strips of complementary sections are arranged to overlap, one of said strips having an offset indicated at 11 of sufficient width to receive the other of said strips, and these overlapping strips are connected together by bolts or rivets 12, or in fact any other fastening means which may be found to be most desirable. It is of course to be understood that the strips formed in this way and arranged to overlap may be connected together by the

keys or clips and the connecting bands or straps referred to herein, as will be obvious.

In arranging the sections to form a culvert any number thereof may be employed to produce the desired circumference, but usually two sections only are necessary, as clearly shown in the drawings, preferably arranged as lower and upper complementary sections. It will be noted that the sections of the culvert embodying this invention may be all alike, thus making it unnecessary to keep two different kinds of sections in stock to form a complete pipe or culvert.

Many advantages are obtained by a construction of sheet metal culvert along the lines as herein specified, some of which advantages having already been set forth in the objects of this invention, and it will be perfectly obvious that the assembling of the parts is simple and effectual and is of such a character that it may be accomplished where the work of installing a culvert is being carried on. It is to be further noted that the sections are constructed without outstanding flanges and that the complementary sections are adapted to be connected together with their longitudinal edges abutting, without the use of bolts, rivets, or similar fastening devices engaging the metal sections themselves.

Having thus described my invention, what I claim is:—

1. A sheet metal culvert comprising complementary sections having longitudinal abutting edges, a flat metal strip or bar secured to each section along the longitudinal edge thereof, and fastening means for securing adjacent strips together, said fastening means also serving to retain the longitudinal edges of the sections in abutting relation.

2. A sheet metal culvert comprising complementary sections, having longitudinal abutting edges, a flat metal strip or bar secured to each of said sections, the adjacent strips or bars of complementary sections also abutting, and means for fastening said adjacent strips or bars together.

3. A sheet metal culvert comprising complementary sections, a metal strip or bar secured to each of said sections, and a sheet metal clip for fastening the strips or bars of adjacent sections together.

4. A sheet metal culvert comprising complementary corrugated sections, a metal strip or bar secured to the convex corrugations of each section, said strip being so formed as to leave a space at intervals between the culvert and the strip, and means for fastening the strips or bars of adjacent sections together.

5. A sheet metal culvert comprising complementary corrugated sections, a metal strip or bar secured to the convex corruga-

tions of each section, and a sheet metal clip for fastening the strips or bars of adjacent sections together.

6. A sheet metal culvert comprising complementary corrugated sections, a straight metal strip or bar secured to the convex corrugations of each section, and sheet metal clips passing between the sections and said strips in the space between the convex corrugations and engaging the strips or bars of adjacent sections for fastening them together.

7. A sheet metal culvert comprising complementary corrugated sections, metal strips or bars extending longitudinally of the sections and secured to the convex corrugations of said sections so as to form passages between the sections and the metal strips, and sheet metal keys or clips inserted within said passages and engaging the strips of opposite sections to securely fasten said sections together.

8. A sheet metal culvert comprising complementary sections, a flat metal strip or bar secured to each longitudinal edge of said sections, the metal strips of opposite sections abutting when the same are in assembled relation, and means for fastening said abutting strips together.

9. A sheet metal culvert comprising complementary sections, a metal strip or bar secured to the convex corrugations of each of said sections, said strip being so formed as to leave a space at intervals between the culvert and the strip, and means for fastening the strips of complementary sections together at points intermediate the convex corrugations of the sections.

10. A sheet metal culvert comprising complementary corrugated sections, a flat metal strip or bar extending longitudinally of each section and secured to the convex corrugations of said sections, the metal strips of opposite sections abutting when the same are in assembled relation, and means for fastening said abutting strips together at points intermediate the convex corrugations of the sections.

11. A sheet metal culvert comprising complementary corrugated sections, a straight metal strip or bar extending longitudinally of the sections and secured to the convex corrugations of each section, and sheet metal keys or clips transversely curved to conform to the curvature of that portion of the culvert section between each convex corrugation and adapted to be inserted between said sections and the metal strips and bent over the strips to fasten the sections together.

12. A sheet metal culvert comprising complementary corrugated sections, a metal strip or bar extending longitudinally of the sections and secured to the convex corruga-

tions of each section so as to form passages between the sections and said metal strips, and keys or clips so shaped as to conform to the curvature of the concave corrugations and adapted to be inserted within said passages and bent over the strips to fasten the sections together.

13. A sheet metal culvert comprising longitudinally adjacent sections overlapping at their meeting ends, each section having longitudinal edges adapted to abut with the longitudinal edges of a complementary section, metal strips secured along the longitudinal edges of said sections, said strips stopping short of at least one corrugation on one end of each section to permit the overlapping of the meeting ends of the longitudinally adjacent sections, and means for fastening the metal strips of complementary sections together for retaining the sections in connected relation.

14. A sheet metal corrugated culvert having a straight metal strip secured to the convex corrugations thereof.

15. A sheet metal corrugated culvert having a rigid metal strip or bar connected to the convex corrugations thereof, said strip being so formed as to leave a space at intervals between the culvert and the strip.

16. A sheet metal corrugated culvert having longitudinal edges to be connected together, a metal strip or bar connected to the convex corrugations along each longitudinal edge of said culvert, said strip being so formed as to leave a space at intervals between the culvert and the strip, and means for fastening the strips together.

17. A sheet metal culvert comprising complementary corrugated sections, a strip or bar secured to each of the longitudinal meeting edges of opposite sections, said strip attached to the convex corrugations thereof thereby forming passages between the strip and the concave corrugations of said sections, and a key or clip of a size to neatly fit within said passages and transversely curved to conform to the curvature of the concave corrugations, said key or clip adapted to enter the passages to correctly position the longitudinal meeting edges of complementary sections with respect to each other, and also adapted to engage both of said strips to fasten them together for retaining the sections in connected relation.

18. A sheet metal culvert comprising complementary sections, a metal strip or bar secured to each of said sections, and a wedge-shaped key or clip for fastening the strips of adjacent sections together.

19. A sheet metal culvert comprising complementary corrugated sections, a metal strip or bar secured to the convex corrugations of each section and forming passages between the sections and said metal strip,

and a wedge-shaped key or clip entering the passages and engaging the strips of adjacent sections for fastening them together.

20. A sheet metal culvert comprising complementary sections, a metal strip or bar secured to each of said sections, said strip being so formed as to leave a space at intervals between the culvert and the strip, and

means for fastening the strips or bars of adjacent sections together.

In testimony whereof I have affixed my signature in presence of two witnesses.

JOHN H. DEAN.

Witnesses:

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CALVIN T. MILANS.