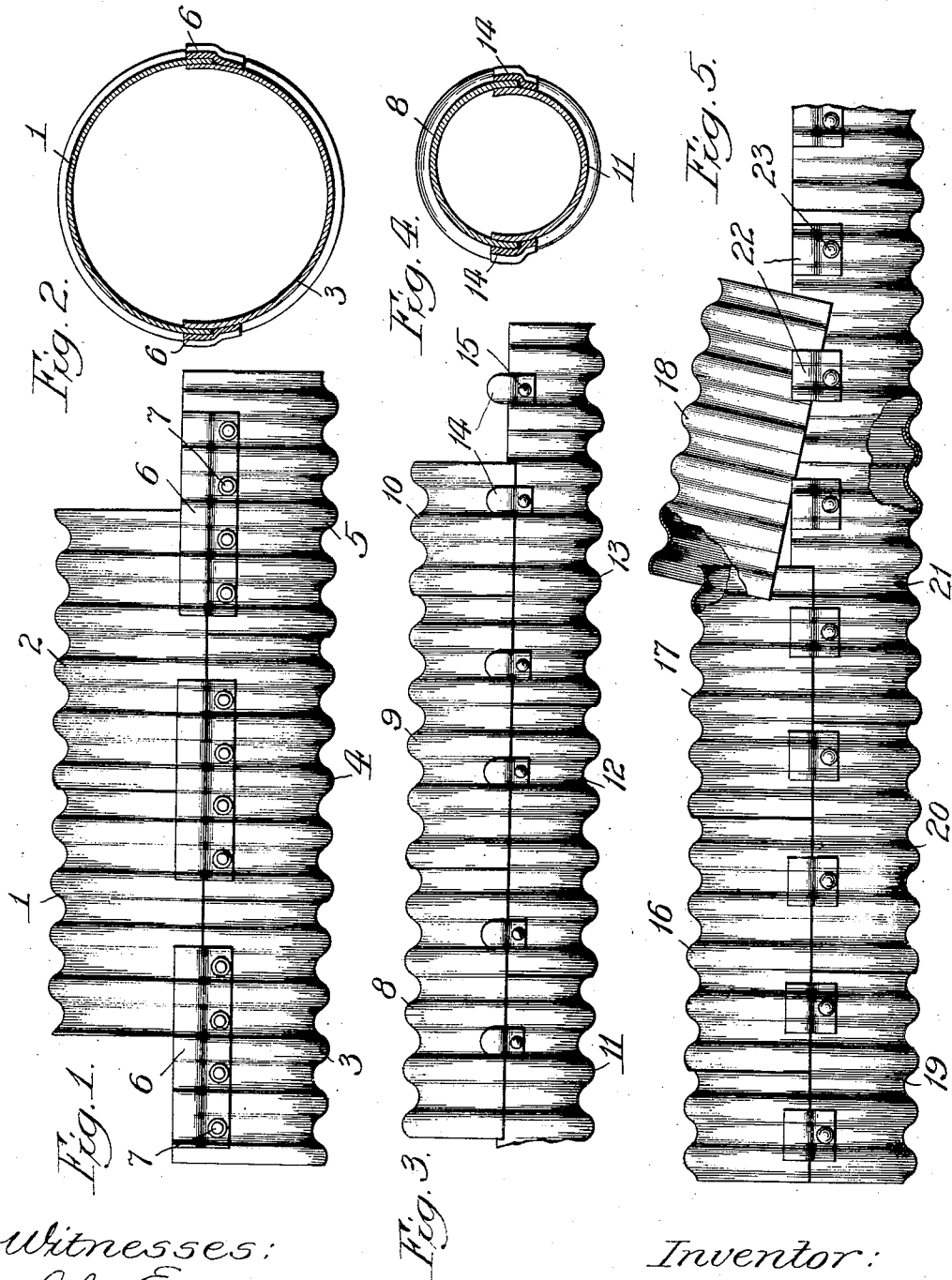


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 CORRUGATED SECTIONAL NESTABLE CULVERT.
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UNITED STATES PATENT OFFICE.

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CORRUGATED SECTIONAL NESTABLE CULVERT.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CHARLES A. FOSTER, a citizen of the United States, residing at Portland, in the county of Multnomah, State of Oregon, have invented certain new and useful Improvements in Corrugated Sectional Nestable Culverts, of which the following is a specification.

My invention relates to that class of culverts which are formed complete of sheet metal provided with annular corrugations extended throughout the entire length of the culvert sections and entirely around them and which are also divided into upper and lower semicircular sections to provide for nesting when being shipped or handled.

My object is to provide a culvert of this kind in which each section is provided with uniform rounded corrugations throughout its entire length extended circumferentially, whereby a series of semicircular sections may be placed in position for use and another series of semicircular sections may be placed on top of them with the ends of the top sections arranged adjacent to the central portions of the lower sections to thereby break the joints and increase the strength of the finished culvert.

A further object is to provide means of simple, durable and inexpensive construction for quickly and easily connecting the upper semicircular sections with the lower ones without the use of bolts, rivets or similar fastening devices so that the connection may be made by simply forcing the upper sections into position where they will be frictionally held against all of the strains to which they are usually subjected when in use.

My invention consists in the construction, arrangement and combination of the culvert sections and the retaining plates, 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 side elevation of a culvert formed of a number of sections embodying my invention. Fig. 2 shows a transverse, sectional view of same. Fig. 3 shows a view similar to Fig. 1 illustrating a slight modification. Fig. 4 shows a transverse, sectional view of same, and Fig. 5 shows a side view of a culvert embodying my invention, one of the top semicircular sections being illustrated in position partly connected to the retaining plates to illustrate the manner

in which the top semicircular sections are placed in position.

Referring to the accompanying drawings, I have used the reference numerals 1 and 2 to indicate the top semicircular culvert sections. Each of these sections is formed complete of a single piece of sheet metal provided with rounded corrugations extended at right angles to its longitudinal axis, said corrugations being extended from one end to the other of each section.

In Figs. 1 and 2, the numerals 3, 4 and 5 are used to indicate the lower culvert sections. They are identical in construction with the upper ones except that the lower ones are slightly smaller in diameter than the upper sections. In this connection it is obvious that both the upper and lower sections may, if desired, be made of the same size and then the side edges thereof may be spread or contracted so that the side edges of one may be admitted between the side edges of the other.

Fixed to each side edge of each lower section is a retaining plate indicated in Figs. 1 and 2 by the numeral 6. These plates are held to the adjacent culvert section by means of devices such as rivets 7 as illustrated in Fig. 1. Any ordinary means may, if desired, be used for connecting these plates to the culvert sections. Each plate is provided with corrugations similar in size and shape to the corrugations on the adjacent portions of the culvert sections. The upper edges of the plates preferably stand substantially flush with the upper edges of the culvert section to which they are attached and said plates have their body portions slightly spaced apart from the adjacent sides of the culvert sections to thereby permit the admission of the side edges of upper culvert sections into said spaces between the side edges of the lower culvert sections and the said plates.

In the modification illustrated in Figs. 3 and 4, I have used the numerals 8, 9 and 10 to indicate the upper sections; 11, 12 and 13 to indicate the lower sections and in place of the plates 6, I have malleable cast plates held to the adjacent culvert sections by means of fastening devices such as 15. I preferably provide two or more of these plates 14 for each side of the lower culvert sections.

In the modified form illustrated in Fig. 5, I have used the numerals 16, 17 and 18

to indicate the upper culvert sections and 19, 20 and 21 the lower sections. Instead of the retaining plates shown in the other forms of my invention I have illustrated retaining plates 22 held to the lower sections 5 by means of fastening devices such as rivets 23. These retaining plates are each preferably made of a single piece of sheet metal which is shaped by means of corrugations 10 to conform to the surface to which it is attached, and I preferably provide two or more of said plates for each lower culvert section. Some of the plates illustrated in this form of the invention are shown to be 15 connected to the lower culvert sections at the point where the corrugation forms a groove and others are connected to the lower culvert section at points where the corrugations form ribs but in both cases the plates 20 are made to conform to the surfaces to which they are attached so that a mating upper culvert section may be inserted therein between the plates and the upper edges of the lower sections.

25 In practical use, I first lay a number of lower sections in position adjacent to each other with the end corrugations of one section overlapping the end corrugations of the adjacent section so that the completed 30 lower culvert portion will have corrugations throughout its entire length equally spaced apart. I then place upper semicircular sections in position on the lower ones, the ends of each upper section being arranged adjacent to the central portions of the lower sections. With this means of placing the various sections in position the necessity for having the corrugations of the lower sections of uniform length is made apparent as the cor- 40 rugations in the upper sections must fit into those of the lower sections throughout their entire length. By having the retaining plates fixed to the same section as, for instance, to the lower section, as shown in 45 the drawings, a desirable result is attained for this reason. When connecting upper sections to lower ones I have found it desirable to first place one end of the upper section in position between the plates and body portion of the lower section on both sides and 50 then the remainder of the upper section may be readily and easily forced in position and the ribs and corrugations on both the upper and lower sections will serve as guides to 55 enable the operator to accurately space the upper sections with relation to the lower sections and to each other. Furthermore on account of the fact that in handling semicircular sheet metal culvert sections they 60 are frequently sprung or contracted to such an extent that it would be impracticable in some instances to fit them together accurately if the entire edges of the upper section were placed in position adjacent to the space 65 between the upper edges of the lower sec-

tions and the plates on the lower sections. I therefore have arranged the retaining plates in such a manner that the upper sections may be placed in position conveniently and easily by placing one end of each upper section in position first and then afterward 70 forcing the remainder of the upper section into position. In order to accomplish this result successfully and easily it is advantageous to have the retaining plates both 75 placed on the same section for the reason that, as may be seen in Fig. 5, when an upper plate has only one end placed in position, the corrugations thereof are not in line with the corrugations of the lower section 80 and its plates. However if the corrugations of the upper section on both sides are at the same angle relative to the corrugations of the plates and the lower section, then the said upper section may be readily and easily 85 tilted to the position shown in the finished culvert at the left portion of Fig. 5.

In the form of my invention illustrated in Figs. 3, 4 and 5, I have shown the retaining plates spaced apart from each other and 90 also so arranged on the lower sections that they stand spaced apart from the ends of the lower sections and also from the central portion of each lower section. The advantage of this arrangement is that when assembling culvert sections in the manner illus- 95 trated in the drawings; that is to say, with the ends of the lower sections arranged in overlapping positions and with the ends of the upper sections arranged in overlapping 100 positions and also arranged at points adjacent to the central portions of the lower sections, I find it advantageous to have the plates spaced apart both from the ends of the lower sections and also from the central 105 portions so that where a double thickness of the material occurs as, for instance, where the ends of the culvert sections overlap, it is not desirable to have the retaining plates for the reason that it would be difficult to force 110 two thicknesses of the culvert sections between parts of the retaining plates and only a single thickness between other parts; in other words if the retaining plates extended the entire length of the culvert sections there 115 would be places where a double thickness of material would be arranged between the retaining plates and the lower culvert section and other places where there would be only one thickness and furthermore at the point 120 where the lower sections overlap each other at their ends it is not desirable to have the retaining plates for the reason that the retaining plates in themselves would have to overlap each other thus making it impos- 125 sible to place an upper culvert section in position.

I claim as my invention:

1. An improved culvert, comprising upper and lower semi-circular sections, each formed 130

of sheet metal corrugated throughout its length along lines substantially at right angles to its longitudinal axis, a number of retaining plates fixed to one side of one of said
 5 semicircular sections, said plates being spaced apart from each other and being firmly fixed at one end to the adjacent semicircular section and each having its body portion slightly spaced apart from the adjacent portion of the section to which it is
 10 attached to admit the edge of the other semicircular section between the plates and the section to which they are attached.

2. A culvert, comprising a lower semicircular culvert section and an upper semicircular culvert section, each being formed of sheet metal and being provided with corrugations throughout its entire length, said
 15 corrugations being substantially at right angles to the longitudinal axis thereof, and two retaining plates, one on each side of the lower culvert section and designed to receive the edges of the upper culvert section between them and the adjacent surfaces of the
 20 lower culvert section to which they are attached.

3. A culvert, comprising a lower semicircular culvert section and an upper semicircular culvert section, each being formed of sheet metal and being provided with corrugations throughout its entire length, said
 30 corrugations being substantially at right angles to the longitudinal axis thereof and two retaining plates, one on each side of the lower culvert section and designed to receive the edges of the upper culvert section between them and the adjacent surfaces of the
 35 lower culvert section to which they are attached, said plates having their inner surfaces shaped to conform to the corrugated surfaces of the lower culvert section to which they are attached.

4. A culvert, comprising a number of semicircular lower culvert sections and a number
 45 of semicircular upper culvert sections, each culvert section being provided with corrugations throughout its entire length of uniform size, said corrugations being extended substantially at right angles to the longitudinal axis thereof so that a number of lower
 50 sections may be fitted together end to end and a number of upper sections may be placed thereon with their side edges overlapping the side edges of the lower sections and with their end portions arranged between
 55 the end portions of the lower culvert sections upon which they are placed, and a series of retaining plates fixed to the outer surfaces of the lower culvert sections near the upper
 60 edges thereof, said retaining plates being corrugated to conform to the surfaces of the culvert to which they are attached and being

slightly spaced apart therefrom at their upper portions, said parts being so shaped and arranged that an upper section may be applied to the lower sections by first placing
 65 the side edges of one end of the upper section between the said retaining plates and the upper edges of the lower section and then forcing the remainder of the upper section downwardly into the spaces between the
 70 plates and the sides of the lower section until said upper section stands in position substantially parallel with the lower sections.

5. A culvert comprising a series of lower
 75 semicircular culvert sections and a series of upper semicircular culvert sections, each culvert section being provided with uniform corrugations throughout its entire length substantially at right angles to its longitudinal axis so that the lower sections may be
 80 placed together with their ends in overlapping positions and the upper sections may be placed on the lower sections with their ends adjacent to the central portions of the lower
 85 sections and a number of retaining plates on each side of each lower section, said retaining plates being spaced apart from the ends of the lower section and also from the central portion of each lower section and said
 90 retaining plates being designed to receive the side edges of the upper sections between them and the adjacent portions of the lower sections.

6. A culvert, comprising a series of lower
 95 semicircular culvert sections and a series of upper semicircular culvert sections, each culvert section being provided with uniform corrugations throughout its entire length substantially at right angles to its longitudinal axis so that the lower sections may be
 100 placed together with their ends in overlapping positions and the upper sections may be placed on the lower sections with their ends adjacent to the central portions of the lower
 105 sections, and a number of retaining plates on each side of each lower section, said retaining plates being spaced apart from the ends of the lower section and also from the central portion of each lower section, and said
 110 retaining plates being designed to receive the side edges of the upper sections between them and the adjacent portions of the lower sections, said plates being corrugated to conform to the adjacent surfaces of the section
 115 to which they are attached.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

CHARLES A. FOSTER.

Witnesses:

NELLE M. SWART,
 A. B. KINNEY.