D. C. BOYD.

CULVERT.

APPLICATION FILED OCT. 20, 1913.

1,096,993.

Patented May 19, 1914.

2 SHEETS—SHEET 1.

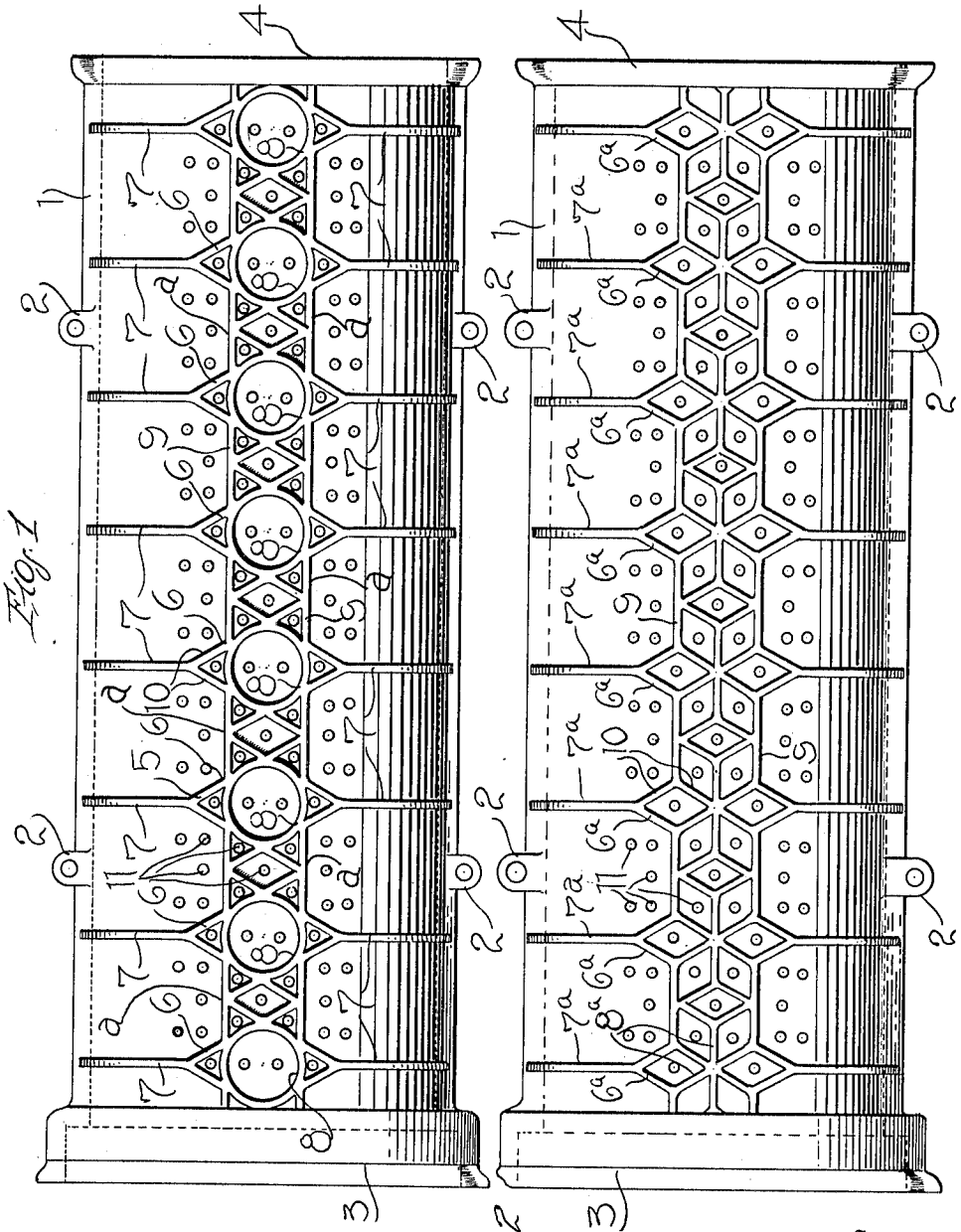


Fig. 1

Fig. 2

Witnesses
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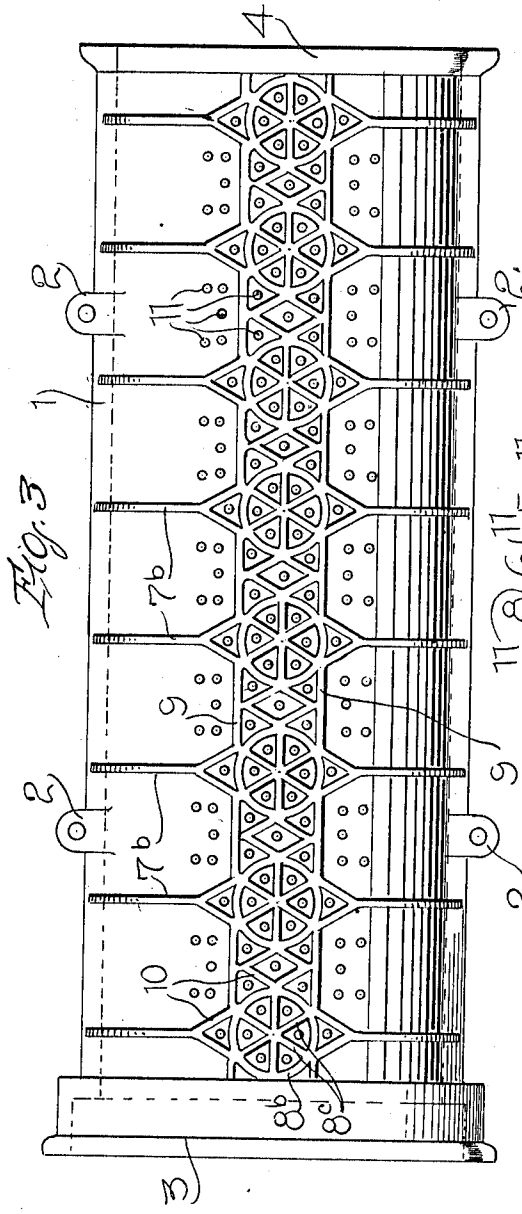


Fig. 3

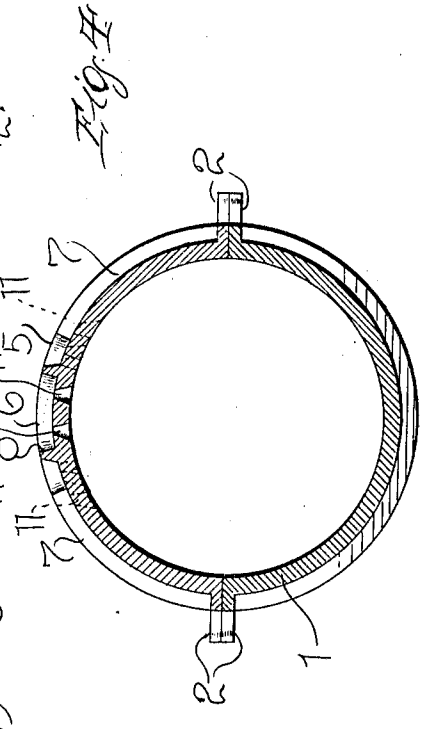


Fig. 4

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UNITED STATES PATENT OFFICE.

DAVID C. BOYD, OF GALION, OHIO, ASSIGNOR TO THE GALION IRON WORKS AND MANUFACTURING COMPANY, OF GALION, OHIO, A CORPORATION OF OHIO.

CULVERT.

1,096,993. Specification of Letters Patent. Patented May 19, 1914.

Application filed October 20, 1913. Serial No. 796,213.

To all whom it may concern:

Be it known that I, DAVID C. BOYD, a citizen of the United States, residing at Galion, in the county of Crawford and State of Ohio, have invented certain new and useful Improvements in Culverts, (Case A,) of which the following is a specification.

This invention comprehends certain new and useful improvements in mains and pipes, relating to water distribution and especially to culvert pipes formed of cast-iron.

From long experience in the art to which this invention appertains, I have found that cast-iron culvert pipes, in contradistinction to those formed of sheet metal, combine to a marked degree, when properly constructed, the characteristics of strength, durability, capacity and economy, being practically indestructible; and I have also found as the results of actual tests, that the weak points of a pipe of this character are at the crown or tread surface where the pipe is liable to become cracked by the cutting through of vehicle wheels, as for example, after the ground surface above the pipe has become soft, or partially or entirely washed away by rains. Hence, it will be understood that it is a desideratum in the manufacture of cast-iron culvert pipes to guard against this contingency and to produce a pipe which, while being relatively light and correspondingly cheap, will be strong, particularly at the crown and well capable of withstanding the crushing or cracking forces to which it is subjected in service.

With a knowledge of these conditions, it is the primary object of my present invention to produce a cast-iron culvert pipe which will possess to a maximum degree, the desirable features above mentioned and combine strength with lightness. And a further object of the invention is a pipe of this character which will be provided in its crown surface or wall with a plurality of perforations or apertures extending therethrough, the same being preferably tapered, with their larger ends disposed innermost, whereby the pipe will be found practical for certain purposes, especially with railroads, the perforations being self-cleaning and not clogging or closing up as the material falling therein will quickly pass through the bottom part of the culvert pipe and be washed away. By making these perforations in tapered form, as thus described, it is at once manifest that economies in the manufacture of the pipe are provided, because the pattern can be readily lifted from the mold, leaving the green sand cores projecting, and in this way the pipe will cost no more to manufacture than the ordinary imperforate pipe.

With these and other objects in view as will more fully appear as the description proceeds, the invention consists in certain constructions, arrangements and combinations of the parts that I shall hereinafter fully describe and claim.

For a full understanding of the invention, reference is to be had to the following description and accompanying drawing, in which,

Figure 1 is a plan view of one form or embodiment of my invention. Figs. 2 and 3 are similar views of other embodiments; and Fig. 4 is a transverse sectional view of the culvert.

Corresponding and like parts are referred to in the following description and designated in all of the views of the accompanying drawing by like reference characters.

Referring to the drawing, the numeral 1 in all of the views designates a semi-cylindrical culvert pipe section designed to mate with or be supported upon and secured to a section of corresponding formation to form a complete cylindrical pipe section, in an evident manner. So far as this invention is concerned, these two halves or sections may be secured together in any desired way, as by bolts or similar fastening devices, extending through apertured and registering lugs 2 and, as is usual, the complete cylindrical section is formed at one end with a bell 3 and at its other end with a bead 4, designed to be received in the bell end of an adjacent pipe section to form a culvert of the required length.

Each semi-cylindrical section 1 is formed on its exterior wall or periphery with a reinforced crown surface which, in that embodiment of the invention which is illustrated in Fig. 1, is designated 5, as a whole. The main characteristic of this reinforced crown surface, the major portion of which extends longitudinally along the medial line of the section, resides in the fact that it is made up of a plurality of stellated ribs 6, the longitudinally extending sides or portions of every two adjacent stellar formations being

joined together, as clearly illustrated in the drawing at *a* and the transversely pointing or extending portions merging into transversely extending ribs 7, which extend to and terminate substantially in the side edges of the semi-cylindrical section. At this point it may be remarked that while the term semi-cylindrical is used to describe the sections 1, the invention is not necessarily limited to sections of that shape, as other shapes may be used as well.

Each stellated rib reinforcement 6 is, in this embodiment of the invention filled in with a ring-like or circular rib 8, as clearly illustrated in Fig. 1.

In that form or embodiment of the invention illustrated in Fig. 2, the stellar rib formations, here designated 6^a are, like the rib reinforcements 6 hereinbefore described integrally joined together and also joined to transversely extending and longitudinally spaced ribs here designated 7^a, but they are filled in, instead of with ring-like or circular ribs 8, with radiating and centrally joined ribs 8^a, the outer ends thereof joining the inwardly disposed angles at the apices thereof.

If desired, the stellar formations may, as illustrated in Fig. 3, be filled in, not only with the circular inserts or reinforcing ribs 8^b, but may contain the radial insert ribs 8^c. 7^b designates the transverse ribs in this view.

It will be seen that there are essential features common to all of these three (3) different forms or embodiments of my invention, namely, the twelve-sided stellar rib reinforcements joined to transversely extending ribs and joined to each other and filled in with insert ribs also of integral formation therewith and of either ring-shape or radial, or both, whereby a crown surface is produced which, not only includes relatively long longitudinally extending ribs 9, and a relatively large number of obliquely extending ribs 10 joined thereto, but within one case also circular ribs, whereby, no matter how a vehicle wheel should happen to strike the reinforced crown surface, that is, no matter at what angle to the transverse or longitudinal axis of the culvert, it will meet with and ride upon a reinforcing rib which will effectually protect the culvert and strengthen it at the point where it needs the most strength and thus the crushing or breaking force will be effectually resisted and the culvert will not be liable to crack.

Another feature of the present invention resides in the provision of the apertures or perforations designated 11. It will be seen that these are formed in and preferably on both sides of the reinforced crown surface 5 and the perforations 11 are tapered and they are disposed flaring inwardly or tapering outwardly, as clearly illustrated in Fig. 4. By having the perforations tapering, as just described, it will be evident that they will be self-cleaning and cannot become clogged or closed up as the material will fall through to the bottom part of the culvert and be washed away. Furthermore, as set forth at the outset of the specification, by making these perforations of tapering form, with their larger ends innermost, the culvert section can be easily formed, owing to the fact that the pattern can be readily lifted from the mold, leaving the green sand cores projecting.

While the accompanying drawing illustrates what I believe to be the preferred embodiment of my invention, it is to be understood that the invention is not limited thereto, but that various changes may be made in the construction, arrangement and proportions of the parts without departing from the scope of the invention, as defined in the appended claims.

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

1. A culvert pipe section formed on its exterior wall with a reinforced crown surface comprising stellated rib reinforcements joined together at their longitudinally extending sides and with transversely extending and longitudinally spaced ribs joined to and extending in opposite directions from their laterally projecting points.

2. A cast-iron culvert pipe section formed on its exterior wall and at the crown surface thereof with a plurality of stellated rib reinforcements and with circular insert ribs within the same.

3. A cast-iron culvert pipe section formed on its exterior wall and at the crown surface thereof with a plurality of stellated rib reinforcements and with radial reinforcements within the same.

4. A cast-iron culvert pipe section formed on its exterior wall and at the crown surface thereof with a plurality of stellated rib reinforcements and with circular and radial rib reinforcements within the same.

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

DAVID C. BOYD.

Witnesses:
GARDA HOLMES,
W. J. GEER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."