A. SMITH.

DOUBLE WALLED STRAINER FOR CULVERTS, DRAINAGE CASINGS, &c., AND CONNECTING MEANS THEREFOR.

APPLICATION FILED JULY 29, 1913.

1,165,137.

Patented Dec. 21, 1915.

5 SHEETS—SHEET 1.

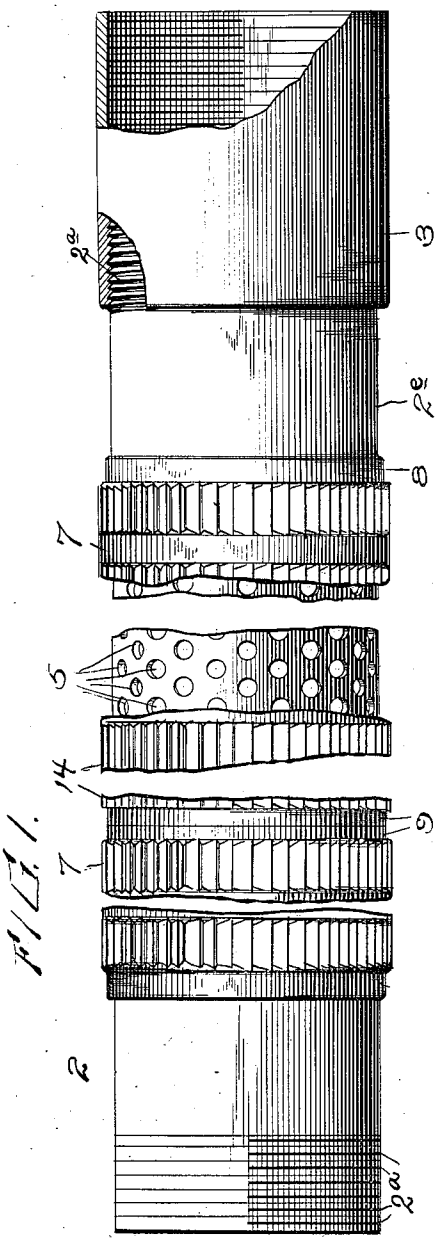


Fig. 1.

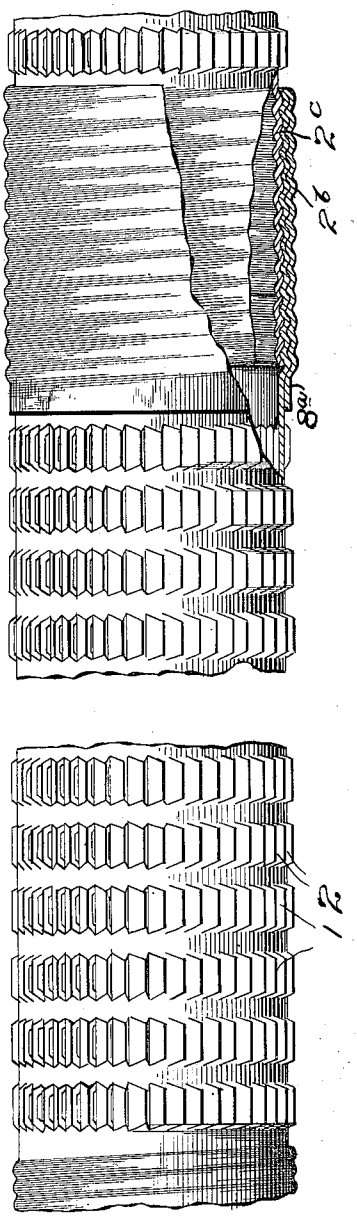


Fig. 2.

Witnesses

R. S. Wagner.

M. V. Simms.

Inventor

Andrew Smith,

By Eugene C. Brown

Attorney

A. SMITH.

DOUBLE WALLED STRAINER FOR CULVERTS, DRAINAGE CASINGS, &c., AND CONNECTING MEANS THEREFOR.

APPLICATION FILED JULY 29, 1913.

1,165,137.

Patented Dec. 21, 1915.

5 SHEETS—SHEET 2.

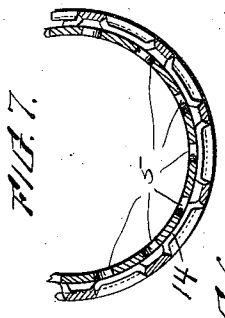


FIG. 7.

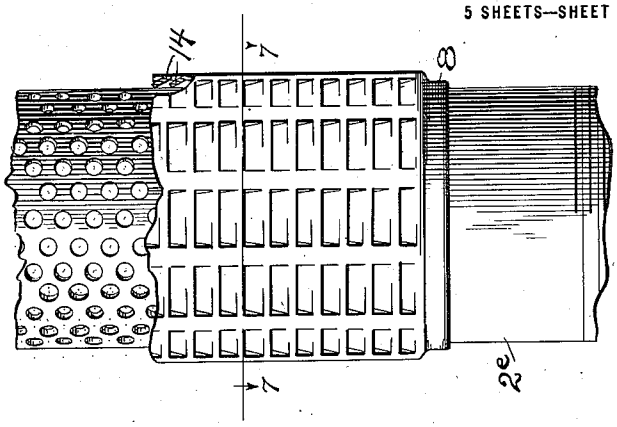


FIG. 6.

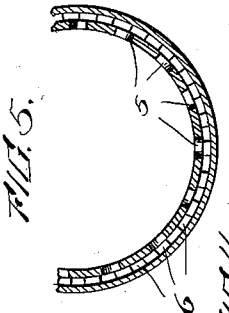


FIG. 5.

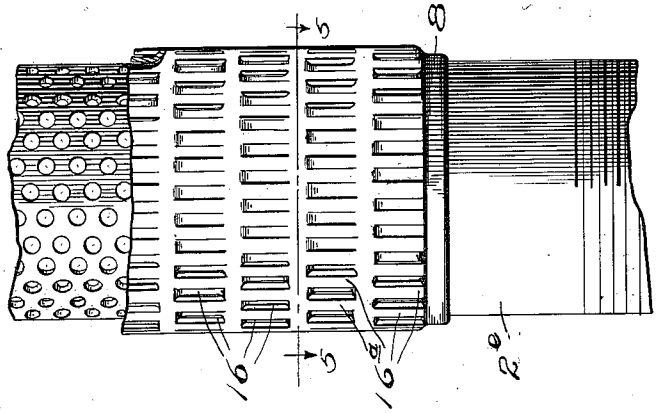


FIG. 4.

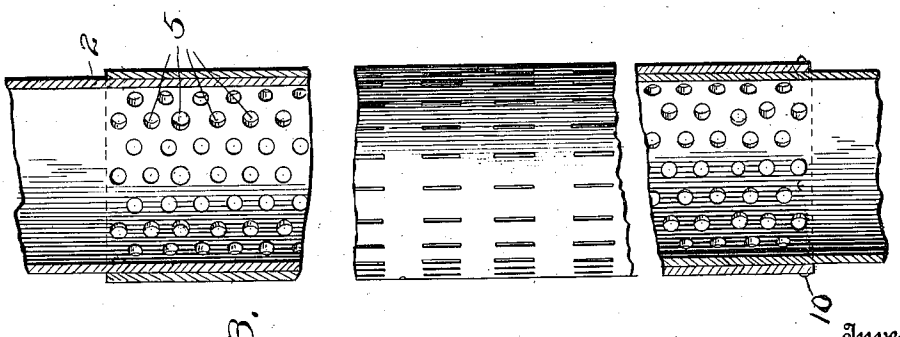


FIG. 3.

Witnesses

R. S. Trogner.

M. V. Simms.

Inventor

Andrew Smith,

By Eugene C. Brown

Attorney

A. SMITH.

DOUBLE WALLED STRAINER FOR CULVERTS, DRAINAGE CASINGS, &c., AND CONNECTING MEANS THEREFOR.

APPLICATION FILED JULY 29, 1913.

1,165,137.

Patented Dec. 21, 1915.

5 SHEETS—SHEET 3.

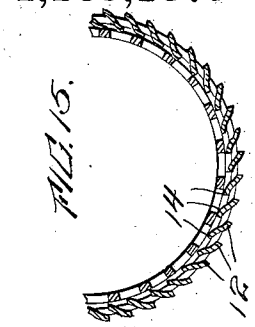


FIG. 5.

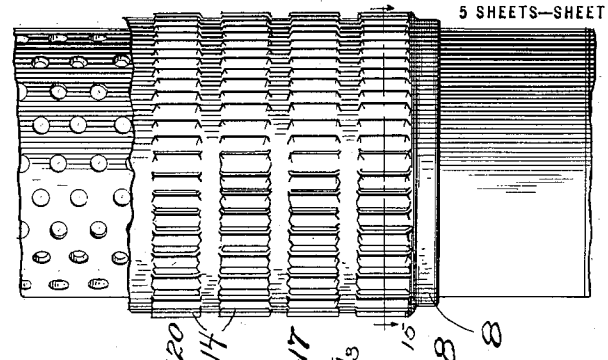


FIG. 14.

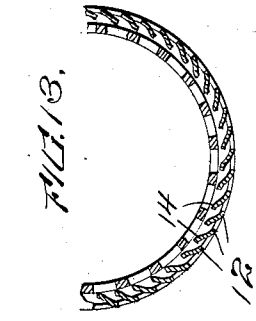


FIG. 13.

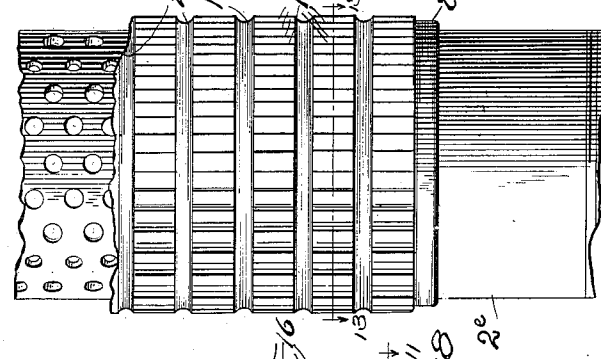


FIG. 12.

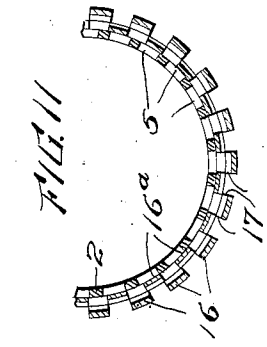


FIG. 11.

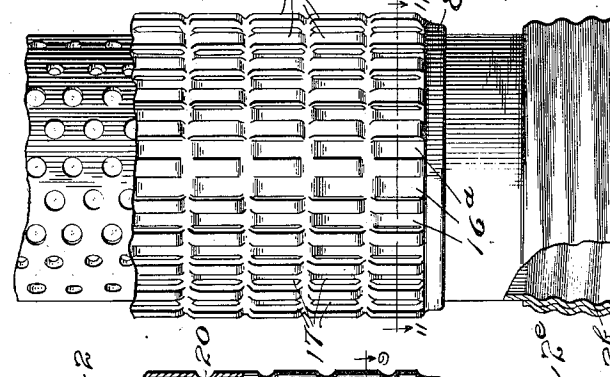


FIG. 10.

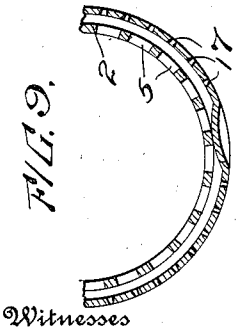


FIG. 9.

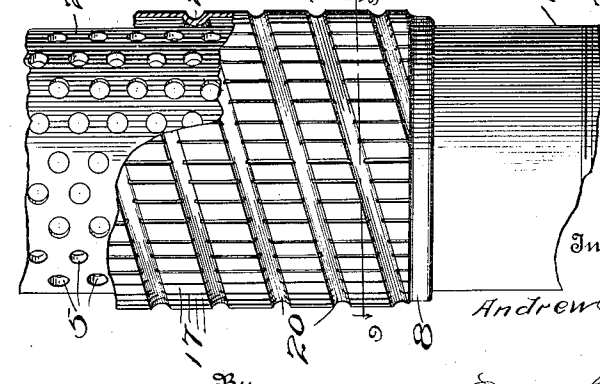


FIG. 8.

Witnesses

R. S. Trogner.

M. V. Simms.

Inventor

Andrew Smith.

By

Eugene C. Brown

Attorney

A. SMITH.

DOUBLE WALLED STRAINER FOR CULVERTS, DRAINAGE CASINGS, &c., AND CONNECTING MEANS THEREFOR.

APPLICATION FILED JULY 29, 1913.

1,165,137.

Patented Dec. 21, 1915.

5 SHEETS—SHEET 4.

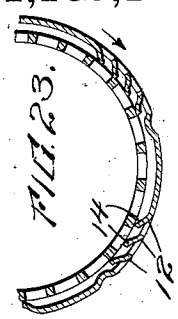


FIG. 23.

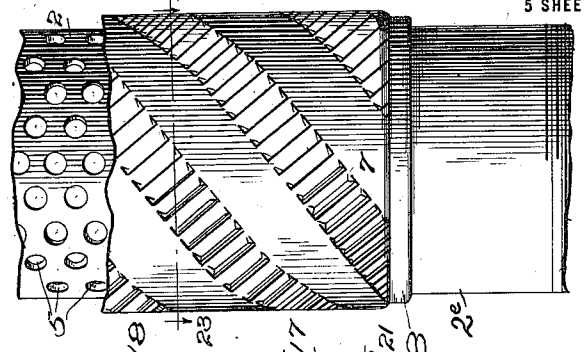


FIG. 22.

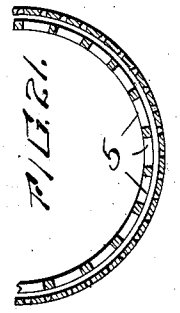


FIG. 21.

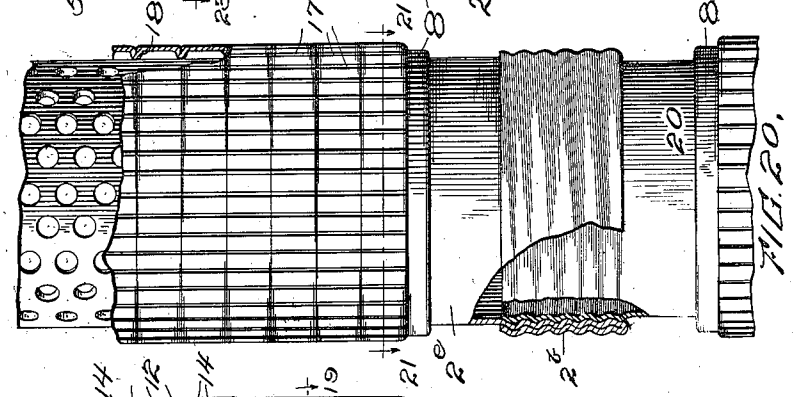


FIG. 20.

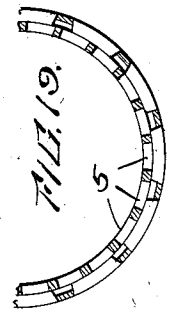


FIG. 19.

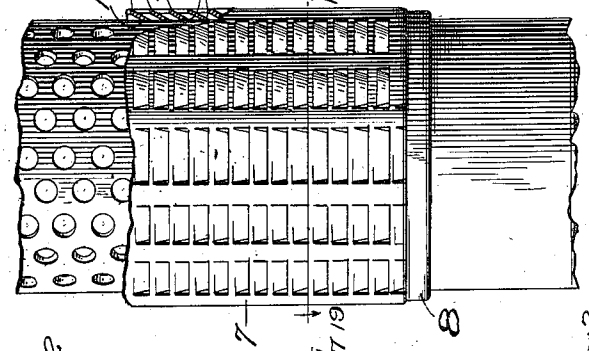


FIG. 18.



FIG. 17.

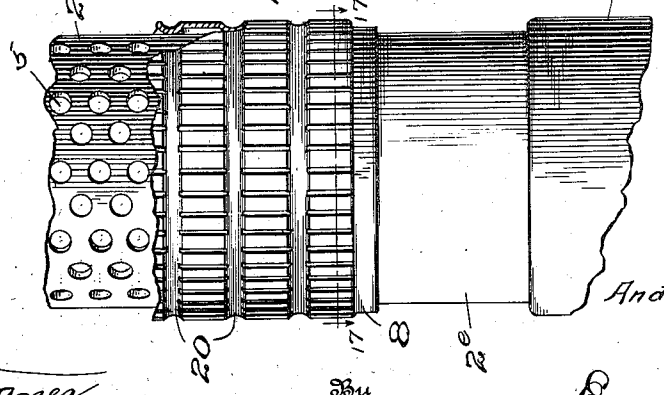


FIG. 16.

Witnesses

R. S. Trogner.

M. V. Simms.

Inventor

Andrew Smith,

By

Eugene C. Brown

Attorney

A. SMITH.

DOUBLE WALLED STRAINER FOR CULVERTS, DRAINAGE CASINGS, &c., AND CONNECTING MEANS THEREFOR.

APPLICATION FILED JULY 29, 1913.

1,165,137.

Patented Dec. 21, 1915.

5 SHEETS—SHEET 5.

FIG. 24.

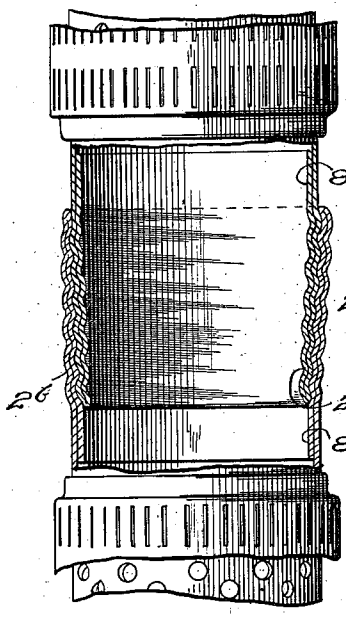


FIG. 25.

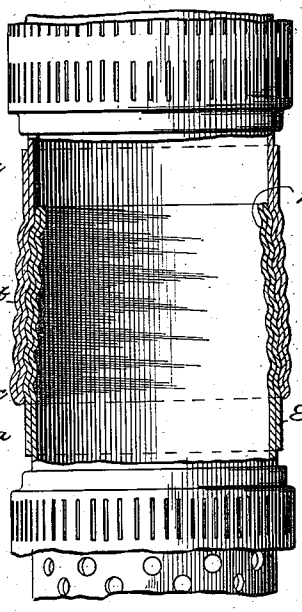


FIG. 26

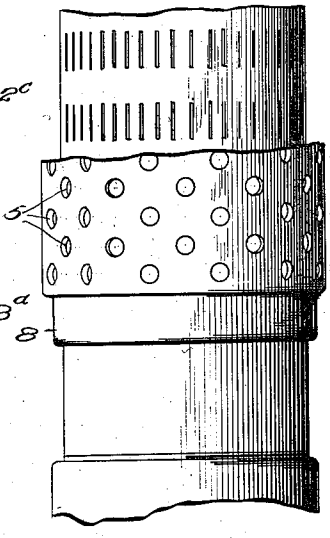


FIG. 27.

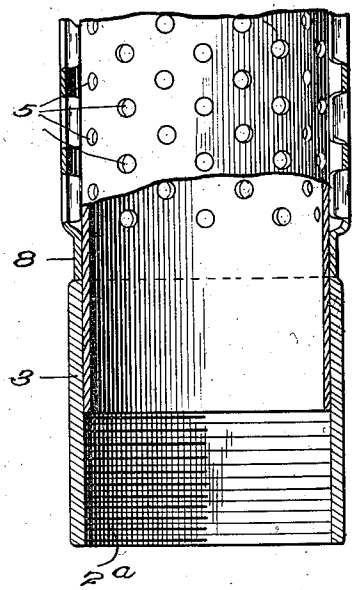
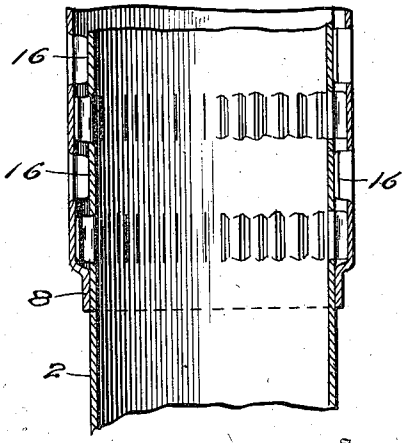


FIG. 28.



Witnesses

R. S. Trogner.

M. V. Simms.

Inventor

Andrew Smith,

By Eugene C. Brown

Attorney

UNITED STATES PATENT OFFICE.

ANDREW SMITH, OF SAN MATEO, CALIFORNIA.

DOUBLE-WALLED STRAINER FOR CULVERTS, DRAINAGE-CASINGS, &c., AND CONNECTING MEANS THEREFOR.

1,165,137. Specification of Letters Patent. Patented Dec. 21, 1915.

Application filed July 29, 1913. Serial No. 781,820.

To all whom it may concern:

Be it known that I, ANDREW SMITH, a citizen of the United States, residing at San Mateo, in the county of San Mateo and State of California, have invented certain new and useful Improvements in Double-Walled Strainers for Culverts, Drainage-Casings, &c., and Connecting Means Therefor, of which the following is a specification.

This invention relates to perforated casings for use in culverts, drain tiles, well-strainers, or curbing, etc., and its object is to provide a casing section having an integral, intermediate duplex draining or strainer portion.

A further object is to provide a casing section having an intermediate double-walled draining portion and single-walled terminal end portions which may be connected by threaded union members or other connecting means with the ordinary culvert, well, or other drainage casings.

It is frequently desirable to introduce draining sections into a line of culvert pipe or well casing. While such drainage section may comprise a single-walled perforated or slitted pipe, yet I have found that a double-walled casing is much more effective in securing an increased drainage capacity and is less liable to become clogged by the surrounding earth, sand and gravel. When a casing is drilled with holes or otherwise perforated, the metal walls are necessarily much weakened but by my invention the perforated inner casing is strengthened by the outer perforated strainer portion which is welded or riveted to the inner casing so that the whole becomes an integral unit. The perforations are confined to the double-walled portion, the single-walled ends being imperforate.

The structural feature of my invention and the advantages which are derived from its use will be understood from the following description in connection with the accompanying drawings, in which—

Figure 1 is an elevation of a casing partly in section, embodying my invention; Fig. 2 is an elevation of a casing showing one of my preferred forms of threaded connections; Figs. 3 to 28, inclusive, illustrate various embodiments of my invention.

Referring to Fig. 1, the casing section comprises a main casing member 2, which I have illustrated as having threaded terminal portions to receive ordinary coupling unions 3, and an intermediate portion provided with perforations which may be in the form of holes drilled or punched or sheared therein. The outer member 7 of the duplex drainage portion which is slid over the perforated portion of the main casing is preferably a single tube but I may form it of two similar parts which abut at the center, the abutting flanges 9 being welded together, or by spirally corrugating them they may be screwed together by means of my improved connection as shown in Fig. 2, or they may be riveted or otherwise connected. The terminal end rings or flanges 8 of the outer portion are welded to the inner main casing portion, preferably by the oxyacetylene or electric welding process, so that the outer casing member becomes integral with the main casing 2, and the whole constitutes an integral casing section or unit having an intermediate duplex draining portion. The parts may be riveted together to make an integral structure, as shown at 10, Fig. 3, but it is far preferable to weld them.

The outer element or member 7 is provided with narrow sheared slits to form a screen or strainer. In the shutter-like forms shown in Figs. 1, 6, 12, 14 and 22, the slits are bounded by the inner edges of the outer lips and the outer edges of the inner lips 14 of the punched metal parts. The slits are preferably first formed in the sheet metal, from which the casing is constructed, by shearing the metal in the manner disclosed in my prior Patents Nos. 1,027,917, 1,028,066 or 1,055,675. The slits formed in accordance with the processes of my said prior patents are practically smooth-walled and may be thoroughly protected from corrosion by galvanizing, "sherardizing" or other coating process, and the width of the slits may be made as narrow as desired, depending upon the character of the formations in which the drain casing is to be embedded.

The sheared sheets are bent into tubular form and welded at the seam or joint to form tubular sections, but it is obvious that the narrow slots may be formed by perforating the casing. I prefer to form the outer member, or slip-over portion, of each cas-

ing section of a continuous length of sheared tube or pipe, making it necessary only to weld the ends 8 to the main casing.

The elongated narrow slits in the outer casing member permit water or oil to pass freely therethrough and are not liable to become clogged because of the protection afforded by the projecting lips and also because the inner side of the slit opens at once into an enlarged cavity between the double walls of the drainage casing. Having thus prevented the ingress of coarse sand and other particles of the soil, I am enabled to use larger apertures in the inner wall. As shown in the cross-sectional views, Figs. 7, 13, 15, 19 and 23, the inner edges of the inturned lips 14, may be constructed to bear against the inner casing and maintain the inner and outer walls spaced apart sufficiently to insure a free unobstructed passage of the water or oil entering through outer strainer casing or screen.

The main casing 2 is constructed from heavy sheet metal and can be made of non-corrosive material. The outer slip-over member 7, which is provided with practically smooth-walled sheared slits, is usually of thinner sheet metal and may be made of brass, copper or other non-corrosive metal, or other metals may be used and galvanized or otherwise coated to protect from corrosion.

The casing sections or units may be threaded upon either end in the usual manner with the threads either cut or rolled into the metal, as illustrated at 2^a in Fig. 1, and be connected by means of threaded unions or coupling rings 3. In this form of coupling in which the threads are cut into the metal, the walls of the pipe are weakened and the strength of the joint depends upon the comparatively shallow threads. The strength of such couplings is not over 70 per cent. of the strength of the casing at other points.

In order to provide a means for handling the sectional units without injury to the perforated portions, when they are being laid in an open ditch or being forced through a tunnel in constructing a culvert or when being lowered by elevators into the bore of a well, I leave a plain portion 2^e between the duplex strainer portion and the corrugated or threaded end portion. The outer casing member is preferably formed with plain end portions 8 for a distance of a few inches to provide reinforced plain portions. At these plain pipe portions the tongs, clamps or elevators may be attached. The spiral corrugations or threads at the ends are always formed so that the sections will be turned in a right-hand or clock-wise direction, in order that none of the sections may become disconnected. For this reason I arrange the lips of the perforations in the arrangements shown in Figs. 1, 12, 14 and 23, so that they extend in a left-hand direction and when the casing is rotated in a right-hand direction the perforations will not become clogged with earth, as would evidently be the case if they pointed in the opposite direction.

As previously stated, the outer slitted portion forms a strainer and also a reinforcement for the inner perforated member. The slits in the outer member 7, are made to allow the very fine particles of earth to flow in with the water or oil and leaving the coarser particles on the outside of the strainer thus forming a large porous area surrounding the strainer which greatly increases its efficiency. The width of the slits may be varied to suit different conditions and the character of the soil in which the casing is embedded.

The manner in which the metal is sheared and shaped to form the slits will also depend upon the conditions to which the casing is to be subjected. The metal upon one side of each shear cut may be forced inwardly as shown in Figs. 12, 13, 18 and 19; or opposite sides of the cut may be forced in opposite directions as in Figs. 14 and 15. Under some conditions it may be desired to have a perfectly smooth exterior and the slits may be formed by spreading the metal upon either side of a row of slits as in Fig. 3. The process of forming these slits is disclosed in my Patents Nos. 1,027,917 and 1,028,066, dated May 28, 1912 and No. 1,055,675 dated March 11, 1913. The slits are preferably V-shaped in cross-section, with the narrower side outward so that the slit will gradually increase in width from the outer to the inner side of the casing as shown in the outer casing in Figs. 17 and 21. With this construction the slits are not liable to become clogged since any small particles of sand that pass into the slit will immediately pass into a larger opening and cannot wedge or bind between the sides of the slit.

Another method of forming slits is by forcing alternate strips of metal between the slits inwardly as shown at 16 in Figs. 4 and 5. In this construction the slits are formed between the edges of the forced-in strips 16^a of the casing, which also serve to stiffen the casing. It is obvious that the perforated casing may be formed by bending the sheet in the reverse direction so that the sheared strips which have been forced slightly out of the plane of the sheet will extend outwardly of the casing. The slits may also be formed by forcing adjacent alternate strips in opposite directions, as indicated in Figs. 10 and 11. The parallel slits 17, thus formed may be made as narrow as desired for straining purposes, as it is only necessary for the metal strips to be forced to one side slightly more than

half the thickness of the metal. This construction forms an exceedingly efficient strainer as the exterior surface of the finished casing is comparatively smooth, offering no obstruction as it is forced into the bore of the earth in the culvert tunnel or well, and as the slits extend longitudinally, they are not liable to become clogged with earth.

The slots 17 may be uninterrupted, extending across the reinforcing ribs 18, as illustrated in Figs. 20 and 21, and as more fully disclosed in my Patent No. 1,057,098 dated March 25, 1913. This form of slitted casing increases the draining capacity without decreasing the strength of the casing.

I have shown the slitted strainer member placed upon the outside of the inner casing which extends beyond the strainer member at the ends, but under some conditions the strainer member may be placed inside of the main casing member and become the inner part of the double-walled intermediate portion as illustrated in Fig. 26, and this arrangement is included within the scope of my claims.

The casing may be made more rigid by means of corrugations 20 between the series of slits, which may extend circumferentially as in Figs. 12 and 16, or spirally as in Fig. 8. It will be observed that the corrugations bear against the inner pipe and maintain the outer slitted member spaced away from the inner member, thereby insuring an unobstructed passage for the water from the outside to the inside of the casing. The slits may extend into the corrugations in order to provide a passage for the fluids to flow around any obstructions that may be against the strainer.

While it is preferable that the slits should extend longitudinally of the casing since this construction offers less resistance as the casing is being forced into the bore of the earth during the construction of a culvert, draining tunnel or well, yet under some conditions it may be desirable to arrange the slots horizontally in longitudinal series as illustrated in Figs. 6 and 18. It is evident that instead of punching the holes in the inner casing, I may perforate it with sheared slits in the same manner as the outer member is slitted. The lips adjacent the slits in the outer member may be pressed inwardly and those in the inner casing may be pressed outwardly, and the longitudinal series of the inner and outer casing members may alternate or interfit with each other in staggered relation, as illustrated in Fig. 28. It is to be understood, therefore, that my claims cover constructions in which the outer and inner casing members are both provided with sheared slits, or either may be provided with sheared slits and the other with punched holes. Furthermore, it is evident that this arrangement of slitted or slitted and punched members may be applied to casings which are double-walled throughout their extent. The slits may also be arranged in other ways, as for instance, in spiral series as shown in Fig. 22. The corresponding cross-sectional views adjacent each side elevation will make the constructions clear.

I have referred to the single-walled end portions as being imperforate yet there may be conditions in which it is desirable to also provide perforations in the end portions and it is to be understood that such constructions come within the scope of my broader claims. I also regard as within the purview of my invention claimed herein, a construction in which the ends of the outer slip-over strainer member are extended as far as the connecting collars or other connecting means, as illustrated in Fig. 27, and in some cases the slip-over member may be secured to the collar on the end of the casing unit. The threaded end portion may consist of a collar welded to the end of the casing unit. Thus in Fig. 27, it is evident that the slip-over member may be welded to the collar 3 where it abuts the same and the collar may be welded to the inner casing member.

It will be understood that the rolled spiral corrugations which I have described in connection with Figs. 10 and 20, may be applied to an imperforate pipe, conduit, drain tile, culvert or well casing having either plain or corrugated walls, or to a single-walled perforated casing. In Fig. 2, I have illustrated my reinforced spirally corrugated end connection applied to a single-walled culvert or well strainer casing provided with my shutter-like sheared slits.

I have described in detail the various modifications shown in the figures of the accompanying drawings for the purpose of illustrating specific embodiments of my invention, but it is evident that various changes may be made therein without departing from the spirit of my invention. I have shown in the various drawings an outer strainer member having narrow sheared slots therein but it is obvious that this strainer member may be used as an inner section.

The advantages to be derived from the use of my invention disclosed herein in which each sectional unit is an integral structure and in which the intermediate strainer portion comprises duplex walls which mutually reinforce each other, while the whole presents a comparatively smooth unobstructed exterior surface, will be appreciated by engineers.

I claim:—

1. A sheet metal casing for culverts, wells and drainage purposes, comprising sectional

units having an intermediate portion provided with double walls weld-united at the ends of said portion and each of which is perforated, and imperforate single-walled end portions.

2. A sheet metal casing for culverts, wells, and drainage purposes, comprising sectional units having an intermediate portion provided with double walls rigidly united at the ends of said portion, and each of which is perforated, the perforations in the outer wall being narrow sheared slits and the perforations in the inner wall being larger than those in the outer wall.

3. A sheet metal casing for culverts, wells and drainage purposes, comprising a tubular member having an intermediate portion provided with double walls, each of which is perforated, and spirally corrugated end portions, one end being tapered and the other end being correspondingly flared so that the tapered end of one section may be screwed into the flared end of another section.

4. A sheet metal casing for culverts, wells and drainage purposes, comprising a tubular member having an intermediate portion provided with double walls which are weld-united, each of which is perforated, and single-walled end portions, and means for connecting adjacent casing sections together.

5. A sheet metal casing for culverts, wells and drainage purposes, comprising a tubular member having an intermediate portion provided with double walls, each of which is perforated, and spirally corrugated end portions, one end being tapered and the other end being correspondingly flared and being reinforced throughout the corrugated portion.

6. A sheet metal casing for drainage purposes, comprising a tubular member having a perforated intermediate portion and imperforate end portions, and a strainer member provided with narrow sheared slits, and extending concentrically over said intermediate portion and having its ends rigidly secured to said tubular member, the strainer member thereby forming a reinforce for said perforated intermediate portion.

7. A sheet metal casing for culverts, wells and drainage purposes having double walls, each of which is perforated and the perforations in one of the walls being narrow sheared slits.

8. A sheet metal casing for culverts, wells and drainage purposes having double walls with sheared slits in one of the walls, portions of said walls being spaced apart, thereby establishing a passageway for the fluid lengthwise of the drainage section.

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

ANDREW SMITH.

Witnesses:
JAMES F. ROSS,
GUSTAV A. HERBST.