W. G. FARGO.

CONDUIT.

APPLICATION FILED AUG. 16, 1909.

1,021,041.

Patented Mar. 26, 1912.

Fig. 1.

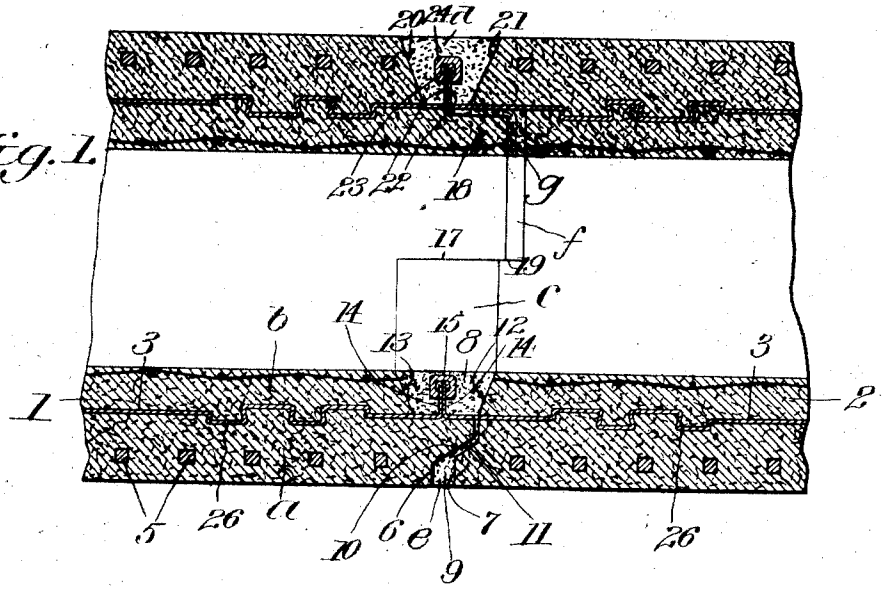

Fig. 2.

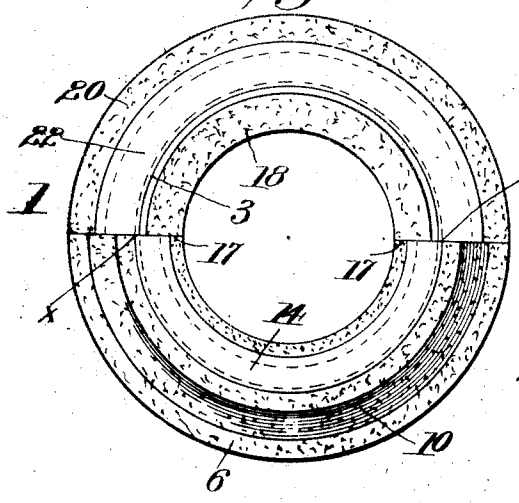

Fig. 3.

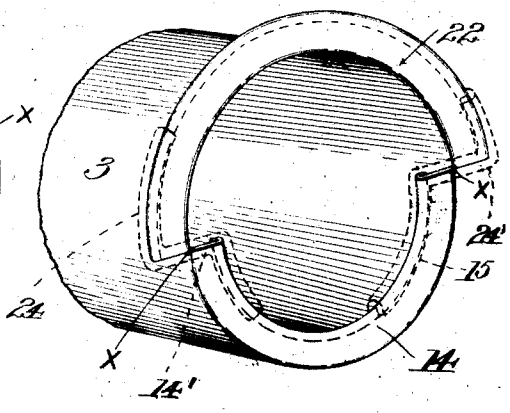

Fig. 4.

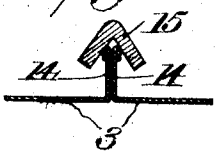

Fig. 5.

Witnesses

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CONDUIT.

1,021,041. Specification of Letters Patent. Patented Mar. 26, 1912.

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To all whom it may concern:

Be it known that I, WILLIAM G. FARGO, a citizen of the United States, residing at Jackson, in the county of Jackson and State of Michigan, have invented certain new and useful Improvements in Conduits, of which the following is a specification.

This invention relates to conduits.

One object is to provide a sectional reinforced concrete conduit which will be tight under such pressure as attained in water supply lines or in carrying gases or other fluids under considerable pressure.

Another object of the invention is to provide a reinforced concrete conduit including a cylinder embedded therein with the cylinder and other reinforcements protected against deteriorating agencies either from the atmosphere without or from the fluids within the conduit.

Another object of the invention resides in the provision of a reinforced concrete conduit composed preferably of sections, each section including a thin cylinder embedded in the concrete with the abutting ends of the cylinders jointed by sealing strips or bars which are compressed by suitable tools over the ends of abutting cylinders of the conduit after the sections are laid.

A still further object of the invention resides in the provision of a reinforced concrete conduit composed preferably of sections, with each section having a metallic cylinder embedded therein with the ends of the cylinder slitted or bisected, to permit of the formation of upper semi-annular outwardly directed flanges and oppositely disposed inwardly directed semi-annular flanges the abutting flanged ends of the cylinders being so disposed with relation to one another that they may be jointed together through the instrumentality of suitable sealing strips which will permit of a small longitudinal movement or stretching of the conduit sections after completing the joints to provide an expansion joint and also to permit of longitudinal adjustment in bringing the flanges together when applying the sealing strips.

It is still further designed to provide a sectional reinforced concrete conduit embodying an inner and an outer jacket interposed between which is disposed a metallic cylinder having inwardly and outwardly directed flanges at its ends, the cylinder and its ends being not exposed to deteriorating agencies either from the atmosphere without or from the fluids within the conduit.

With the above and other objects in view, the present invention consists in the combination and arrangement of parts hereinafter more fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that changes may be made in the form, proportion, size and minor details without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings:—Figure 1 is a longitudinal sectional view of two abutting sections of the conduit assembled in accordance with my invention. Fig. 2 is an end view of one of the sections. Fig. 3 is a detailed perspective view of one end of one of the cylinders illustrating the flanged ends. Fig. 4 is a detailed view illustrating the position of one of the sealing strips with relation to abutting ends of metallic sections prior to compressing the sealing strip over the abutting ends of the cylinders. Fig. 5 is a similar view illustrating the sealing strip compressed or otherwise applied permanently to the abutting ends of the cylinders.

Referring now more particularly to the accompanying drawings, the reference characters 1 and 2 indicate abutting concrete sections, each section having a thin metal cylinder 3 embedded therein, the cylinders being slitted or bi-sected at each end to permit of the formation of the inwardly directed flanges 14 and the outwardly directed flanges 22, as and for the purpose hereinafter understood.

That portion *a* of the concrete upon the outer side of the metallic cylinders 3 constitutes an outer jacket and that portion *b* of the concrete within the cylinders provides a lining so that the cylinders are protected from the deteriorating agencies either from the atmosphere without or from the fluids within the conduit. The conduit is made tight by the metallic cylinders embedded therein, the cylinders not being intended to resist the pressure of the contained fluids, which pressures are sustained by the reinforcing 5 outside of the thin metal cylinders. The lining portion *b* within the cylinders may be reinforced to prevent cracks and to hold it in place. Any type of reinforcement may be employed, and by virtue of the cylinders being embedded in the con-

crete, in the manner stated, they are protected by a smooth concrete lining on the inside.

The concrete section 1 is provided with a semi-annular shoulder 6 at one end for cooperation with the semi-annular shoulder 7 of the concrete section 2 to provide an external semi-annular recess *e* adapted to be filled with mortar or other sealing material 9 to calk the abutting ends of the sections at their lower portions. The section 1 is also provided with a semi-annular inclined meeting face 10 disposed in advance of the shoulder 6 for disposition opposite to the semi-annular inclined meeting face 11 of the section 2, and if these meeting faces 10 and 11 are not fitted tightly together the sealing material 9 may pass into the space between them to seal said meeting faces.

The section 1 has its lining portion *b* terminate short of the shoulder 6, as at 13, for coöperation with the inclined portion 12 of the lining *b* of section 2 to provide an internal recess *c* for the reception of the lower inwardly directed semi-annular flanges 14 of the metallic cylinders. Thus, the recess *c* formed by the inclined portions 13—12 of the linings *b* of the sections 1 and 2 is semi-annular. Said recess is preferably dove-tailed, as shown, in any event being wide enough to permit of the application of the sealing strip 15 over the shouldered edges of the flanges 14. This sealing strip is preferably composed of soft metal, such as iron or lead and is first formed into substantially V shape, as shown in Fig. 4, so that it may be disposed on and compressed over the lower contiguous flanges 14 of adjacent metal cylinders after the conduit sections are laid, as clearly shown in Figs. 1 and 5. The pinching together of this sealing strip 15 could be done in sections, that is, the jaws of the press (not shown) would close on four to six inches at a time and proceed around the semi-annular joint.

After the flanges 14 are secured together the annular recess *c* is filled with mortar or other suitable material 8 to cover the flanges 14 and strips 15 or other securing means and to provide a smooth interior for the conduit.

The recess *c* is bounded at the center of the conduit by the shoulders 17 at the lower ends of the semi-annular projecting portion 18 of the section 1 which shoulders 17 are adapted to rest upon the shoulders 19 of the section 2, there being a second internal semi-annular recess *f* between the abutting ends of the cylinders which will be calked or sealed as are the other recesses by the sealing material *g*.

The outer jacket portion *a* of the section 1 terminates short of the end of the latter throughout substantially one-half of the circumference or periphery of the section 1, and is inclined, as at 20, for coöperation with a similarly inclined portion 21 of the section 2 to provide a semi-annular external recess *d* to receive the upper outwardly directed flanges 22 of the abutting cylinders, as clearly shown in Fig. 1. The edges of the flanges 22 are shouldered, as at 23, to provide an effectual connection between the flanges and the sealing strip 24, which is preferably of the same material as the sealing strip 15 and which is preferably applied to the flanges 22 in the same way as set forth in connection with the sealing strip 15 with relation to the inwardly turned flanges 14 of the metallic cylinders.

After the sealing strip 24 has been applied, the semi-annular recess *d* is filled with mortar or other sealing material to close the joint. This sealing material and also the sealing material in the recess *c* acts not only as a sealing for the joints of the abutting concrete conduit sections but it has the further function of tying the jackets and linings, respectively, to the metallic cylinders, as clearly shown in Fig. 1.

Each end of each concrete section may be formed the same or each section may have one end formed as shown and its opposite end the reverse, that is, the section 1 may have one end formed exactly as shown with its opposite end formed like the end shown of section 2. The reinforcing material of the concrete sections may be tied together, if desired, at the abutting ends of the sections. In any event, the construction of the flange joints herein described permits of a small longitudinal movement or stretching of the pipe sections after completing the joints, the construction also permitting of a longitudinal adjustment in bringing the flanges together when applying the sealing strips or in otherwise securing adjacent flanges together.

From the foregoing it will be understood that the top portion or upper half of the metallic cylinders may be secured together outside of the conduit while the bottom portion or lower half of the metallic cylinders may be connected together within the conduit. At the points where the flanges change in direction from inside to outside, that is, at the points *x*, the cylinders at these points of abutment may be fused, brazed, soldered, welded, riveted or calked. If preferred, the sealing strips may be extended over the ends of the respective flanges 14 and 22, as indicated at 14′ and 24′ in Fig. 3 and the joint *x* between abutting ends of the strips may be calked by using the same soft metal of the sealing strips to seal the joint from either or both sides.

It will be apparent that I provide a water-tight conduit in that if water should seep through the lining portion *b* of the reinforced conduit it will be retained in the

conduit by virtue of the metallic cylinders which are embedded in the concrete sections and which have their ends made watertight by my improved joint between them.

If desired I may form corrugations at intervals in the metal cylinders, as indicated at 26, for the purpose of locking the inside lining *b* thereto and also to lock the outside portion or jacket of the concrete to said metallic cylinders.

What is claimed is:—

1. The combination with a reinforced concrete conduit, of metallic cylinders embedded in the walls of the conduit, each cylinder having its ends provided with inwardly and outwardly directed flanges, the inwardly and outwardly directed flanges of adjacent cylinders being disposed in abutting relation, means for expansively locking the abutting inwardly directed flanges together, and means for expansively locking the outwardly directed flanged ends together.

2. The combination with a reinforced concrete conduit embodying sections, of a metallic cylinder embedded in the walls of each conduit section, each metallic cylinder having inwardly and outwardly turned flanges, means for locking the outwardly turned flanges together, and means for locking the inwardly turned flanges together, said cylinder being peripherally corrugated intermediate its ends only.

3. The combination with a reinforced concrete conduit embodying sections, of a metallic cylinder embedded in each section of the conduit, each metallic cylinder having inwardly and outwardly turned flanges, the inwardly directed flanges of one cylinder abutting with the inwardly turned flanges of the adjacent cylinder, the outwardly turned flanges of one cylinder abutting with the outwardly turned flanges of the adjacent cylinder, means for locking the abutting outwardly turned flanges together, and means for locking the abutting inwardly turned flanges together, the locking means of the inwardly turned flanges being operable from within the conduit.

4. The combination with reinforced concrete conduit sections, of a thin metallic cylinder embedded in the walls of each section, each cylinder being slitted at its ends, the part upon one side of each slit being formed into an inwardly directed flange and the part on the opposite side of the corresponding slit being formed into an outwardly directed flange, and means for sealing or locking the flanged ends of abutting cylinders together.

5. The combination with a concrete conduit, of a plurality of metallic cylinders embedded in the walls of the conduit, each cylinder being bisected at its ends with its bisected portions upon opposite sides of its bisections being formed into flanges, one flange of each end being directed outwardly and the other flange being directed inwardly, and a sealing or locking strip secured to adjacent flanged ends of the cylinders to secure them together and to permit of slight longitudinal movement of the cylinders.

6. The combination with reinforced concrete conduit sections, of a metallic cylinder embedded in the walls of each section, each cylinder being bisected at its ends with each cylinder upon each side of its bisection being formed into flanges, some of the flanges being directed outwardly and some of the flanges being directed inwardly, the outwardly directed flanges of adjacent cylinders abutting, means for sealing or locking the abutting outwardly directed flanges together, the inwardly directed flanges of adjacent cylinders abutting, and means for sealing or locking the abutting inwardly directed flanges together.

7. The combination with reinforced concrete conduit sections, of a metallic cylinder embedded in the walls of each section, each cylinder being bisected at its ends to provide upper and lower portions, with each upper portion formed into an outwardly directed flange, the outwardly directed flanges of the adjacent cylinders abutting, a sealing or locking strip pressed over the outwardly directed flanges of adjacent cylinders, the lower bisected portions of each cylinder being formed into inwardly directed flanges, the inwardly directed flanges of adjacent cylinders abutting, and a sealing or locking strip pressed over the inwardly directed flanges of adjacent cylinders.

8. The combination with reinforced concrete conduit sections, of a metallic cylinder embedded in the walls of each section, each cylinder having upper outwardly directed flanges and also having lower inwardly directed flanges, the outwardly directed flanges being directed toward the periphery of the conduit and the inwardly directed flanges being directed toward the interior of the conduit, means for locking the outwardly directed flanges of adjacent cylinders together, and means for locking the inwardly directed flanges of adjacent sections together, each cylinder having corrugations.

9. The combination with reinforced concrete conduit sections, of a metallic cylinder embedded in the walls of such section, each cylinder at each end having upper and lower flanges, the upper flanges being directed toward the outer periphery of the conduit, a sealing or locking strip pressed over the outwardly directed flanges of adjacent cylinders, the lower flanges of each cylinder being directed inwardly toward the interior of the conduit, and a sealing or locking strip pressed over the inwardly directed flanges

of the adjacent cylinders, each cylinder having dovetailed corrugations formed peripherally thereof.

10. A conduit comprising abutting reinforced concrete sections, one end of one section having an external semi-annular peripheral shoulder, also a projecting shoulder and an inclined meeting face, the abutting end of the adjacent section having an inclined meeting face disposed opposite to the inclined meeting face of the said other section and also having a semi-annular peripheral shoulder arranged to coöperate with the aforesaid semi-annular shoulder to form an external semi-annular recess, said second end also having a projecting shoulder overlapping the projecting shoulder of the first end, the abutting ends of said sections having their upper portions formed to provide an internal semi-annular recess, the abutting ends of the sections at their bores terminating short of each other and inclined to form a second internal semi-annular recess, said concrete sections having a second external semi-annular recess, a metallic cylinder in each concrete section which is bisected longitudinally at its ends only with its bisected ends formed into semi-annular flanges, some of said flanges being directed outwardly with the outwardly directed flanges of the cylinders abutting and disposed in said second external semi-annular recess, the other semi-annular flanges of each cylinder being directed inwardly and disposed in abutting relation in said second internal semi-annular recess, means for securing the abutting externally directed flanges together, means for securing the abutting inwardly directed flanges together, and filling material in all of the recesses.

11. The combination with concrete conduit sections, each section having its ends formed to provide an external and also an internal semi-annular recess at the abutting ends of the sections, of a metallic cylinder embedded in each section, each cylinder having an inwardly and an outwardly directed flange at one end, the outwardly directed flanges of abutting cylinders being disposed in said external recess at the abutting ends of the concrete sections, the inwardly directed flanges of abutting cylinders being disposed in said internal recess of the concrete sections, separate means for securing said inwardly and outwardly abutting flanges of the cylinders together, and means to calk the recesses.

12. The combination with a reinforced concrete conduit having an external and an internal recess, a plurality of metal cylinders embedded in the conduit and having flanges projecting into said recesses, and filling material in the recesses.

13. The combination with a concrete pipe section having an outwardly open recess in its upper portion and an inwardly opening recess in its lower portion, of a metal cylinder embedded in said concrete section and projecting from the ends thereof, the projecting end portions of said cylinder carrying an outwardly extending flange resting in the upper recess of a concrete pipe section, and an inwardly extending flange extending into the lower recess.

14. A concrete pipe formed of sections, said sections when fitted together forming exterior channelways and interior channelways extending each through one-half of the circumference of the pipe, and a metal cylinder embedded in each section having its ends split and its marginal portions bent to form outwardly extending flanges resting in the outwardly opening channelways, and inwardly extending flanges resting in the inwardly opening channelways the flanges of one cylinder being interlocked with those of adjacent cylinders.

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

WILLIAM G. FARGO.

Witnesses:
WESLEY SEARS,
JOHN KLAASSE.