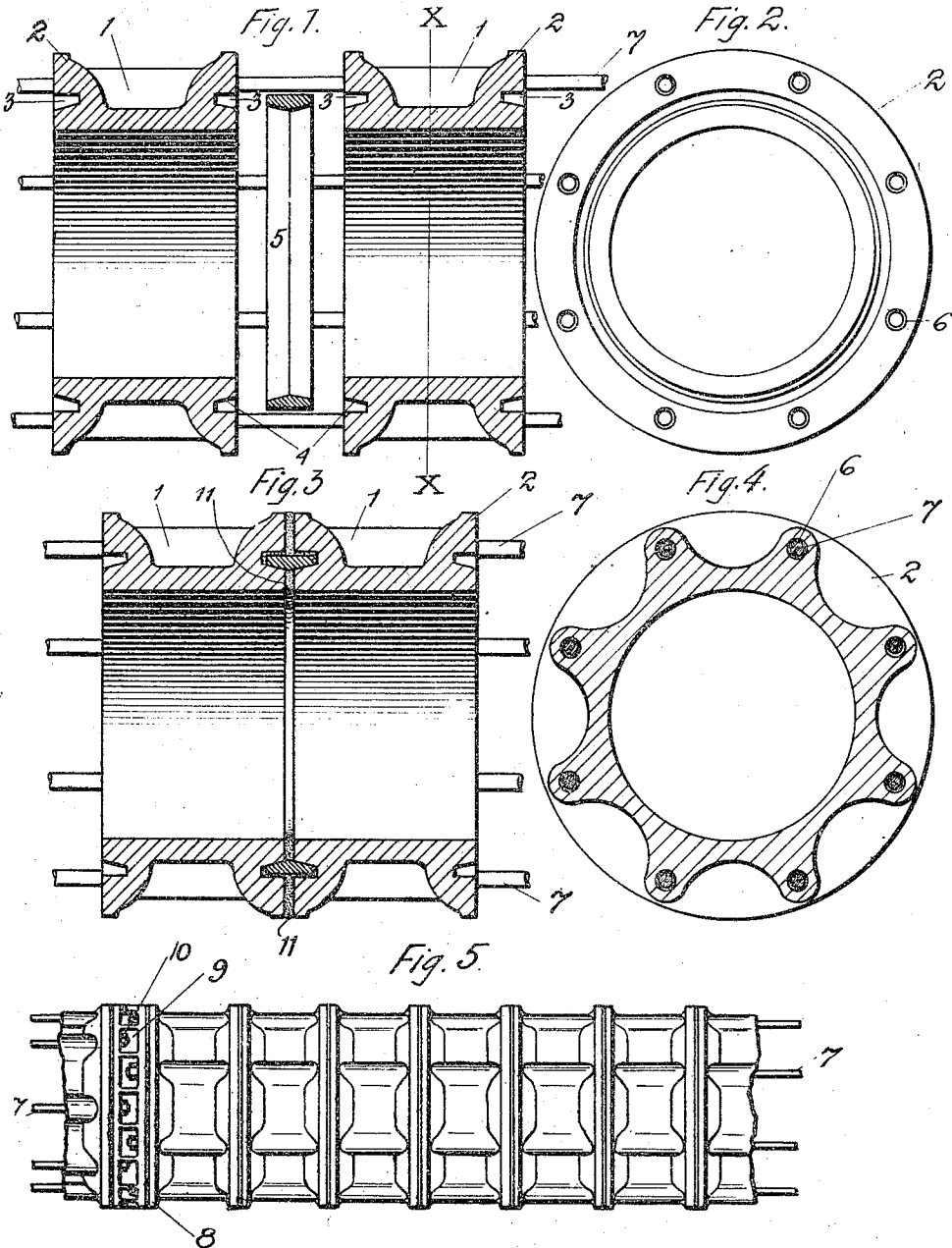


V. V. MESSER.
 REINFORCED CONCRETE PIPE.
 APPLICATION FILED AUG. 10, 1910.

1,013,302.

Patented Jan. 2, 1912.



Witnesses:

J. D. Thompson
Carl A. Pfeiffer

Vladimir V. Messer
 Inventor.

UNITED STATES PATENT OFFICE.

VLADIMIR V. MESSER, OF LOS ANGELES, CALIFORNIA.

REINFORCED-CONCRETE PIPE.

1,013,302.

Specification of Letters Patent.

Patented Jan. 2, 1912.

Application filed August 10, 1910. Serial No. 576,607.

To all whom it may concern:

Be it known that I, VLADIMIR V. MESSER, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Reinforced-Concrete Pipe, of which the following is a specification.

To illustrate the mechanical principle involved in my invention it will be necessary to consider the fiber stresses that are likely to be found in both the reinforcement and the concrete itself of any reinforced concrete pipe made in a common way; i. e., by depositing concrete in the annular form surrounding reinforcement metal contained therein. It is a well known fact that any concrete shrinks quite considerably in its period of setting. This shrinkage of concrete is detrimental to the strength of the pipe made in the above mentioned way and for this reason: the shrinkage of the concrete in this case being opposed by the rigid reinforcement metal produces tension fiber stress in the body of the concrete and compression fiber stress in the reinforcement metal of it, before any pressure at all is introduced inside of the pipe. So it is seen that in a reinforced concrete pipe made in the usual manner the reinforcement part of it which is supposed to resist all the tension produced in the body of the pipe by the inside pressure is found to be in a state of compression with the surrounding concrete in tension.

As soon as the pressure is introduced into the pipe the tension produced by the first stage of rising pressure is taken up by the concrete alone. The tension load on the concrete will increase with the pressure; and at the same time the compression stress of the reinforcement will decrease until it will reach the point where it will change itself into tension stress under influence of rising pressure. At this point the pipe is sufficiently expanded to transfer all the tension on the reinforcement metal; and if the pressure is high enough to load the reinforcement metal to a proper tension limit the reinforced concrete pipe so loaded will leak badly.

When a piece of plain concrete pipe is made with iron sleeves put on it snugly the same way as iron hoops are placed around a barrel then the pipe so reinforced stands the pressure better than an ordinary reinforced concrete pipe with the same amount of reinforcement metal. But again, before the

proper tension stress is developed in the reinforcement metal the pipe is ruined. This is due to the difference between the elastic properties of the concrete and the reinforcement metal.

To provide a construction whereby: the shrinkage strain is eliminated, the difference in elastic properties of the concrete of which the pipe is made and that of the reinforcement metal is taken care of, and general practicability, cheapness and durability of pipe is attained is the object of my invention. I attain these objects by the sectional construction of the pipe illustrated on the accompanying drawing, in which—

Figure 1 is a cross-section of two sections of the pipe before they are put together, with the reinforcement ring between them; Fig. 2, is an end view of a section; Fig. 3, is a cross-section of the two adjoining sections with the reinforcement ring embedded as shown; Fig. 4, a cross-section of the section through the line X—X; and Fig. 5 an assembled side view of the pipe of my invention.

Similar numbers refer to similar parts throughout the several views.

The pipe is made of short sections, hereinafter designated as spools, made of plain concrete and properly seasoned at the factory. Each spool represents a short piece of pipe 1 with the ridges or flanges 2 on both ends. The flanges 2 are provided with the annular grooves 3 concentric with the body of the spool. The inner walls 4 of the grooves 3 are tapered as shown. Said grooves 3 are intended to receive the rings 5 which serve a twofold purpose; they form the reinforcement rings and packing rings at the same time in the manner hereinafter set forth.

The rings 5 are made of flat bars properly bent to circular form welded and machined on the inside surface to form two conical surfaces corresponding to those marked 4 on the drawing. Parallel to the axis of the pipe there are perforations 6 which receive the tension rods 7. The ends of the said rods 7 are received by the cast iron flange 8 which is made in the form of a spool with the pockets 9 on the outside surface of it to accommodate the tension nuts 10 of the rods 7. In order to make a reinforced concrete pipe of these spools the following method is used: the grooves 3 are filled with cement mortar and by forcing two adjoining spools together the ring 5 is caused to force its way into grooves 3 and displace a correspond-

ing amount of mortar 11 into the space between the flat surfaces of the flanges 2, thus producing the necessary amount of mortar to form the joint and to completely embed the reinforcing ring into the cement.

After all spools and rings comprising a certain length of pipe are brought together with the conical surfaces of the joints caused to bear against each other, the end flanges 8 are put in place and the tension rods are brought in tension by screwing the nuts 10. This is the most important part of the operation since at this stage the tapered surfaces of the spools 1 and of the rings 5 respectively, forming two wedges of annular form, slide upon each other and throw the spools 1 into compression and the rings 5 into tension, and at the same time the tension rods 7 being brought into final tension complete the displacement of the mortar out of the grooves 3 thus insuring absolutely tight joints.

It is clear that in the pipe so made the reinforcement rings are in tension and the concrete is in compression before the pressure is introduced inside of the pipe; which is just opposite to the pipes made in a common manner. Now, it is clear that whenever any pressure exists within the pipe there will be two factors contributing to the tension stress in the rings 5. The first factor is the initial stress produced by the action of the tension rods 7, and the second one is the pressure itself. The initial tension will decrease as the pressure increases, since the increasing pressure would relieve the compression of the concrete until the point is reached where the compression of the concrete is relieved altogether and the rings do not resist any other tension but the one produced by the pressure.

The above manner of causing the concrete to lose its compression first before it comes into the state of tension allows me to use a wider range of elastic deformation of the reinforcement metal without injurious effect upon the concrete.

Having thus described my invention, what I claim is:

1. A reinforced concrete pipe comprising a plurality of solid cylindrical sections provided with annular grooves in their ends, a reinforcing ring lying in the grooves between two sections, said ring having inner beveled faces and the inner walls of the grooves being correspondingly beveled, and means for drawing the sections toward each other to cause the beveled faces of the ring and grooves to coact to compress the ends of the sections, the inner walls of the cylindrical sections at their ends being internally unconfined to permit said compression of the ends.

2. A reinforced concrete pipe comprising a plurality of solid cylindrical sections provided with annular grooves in their ends, a reinforcing ring lying in the grooves between two sections, said ring having inner beveled faces and the inner walls of the grooves being correspondingly beveled, and tension rods for drawing the sections toward each other to cause the beveled faces of the ring and grooves to coact to compress the ends of the sections, the inner walls of the cylindrical sections at their ends being internally unconfined to permit said compression of the ends.

3. A reinforced concrete pipe comprising a plurality of solid cylindrical sections provided with annular grooves in their ends, a reinforcing ring lying in the grooves between two sections, said ring having inner beveled faces and the inner walls of the grooves being correspondingly beveled, and tension rods for drawing the sections toward each other to cause the beveled faces of the ring and grooves to coact to compress the ends of the sections, the said sections having flanges at their ends in which said annular grooves are formed, and each section having external longitudinal ribs extending between said flanges, the said tension rods extending through the said flanges and ribs, the inner walls of the cylindrical sections at their ends being internally unconfined to permit said compression of the ends.

4. A reinforced concrete pipe comprising a plurality of solid cylindrical sections provided with annular grooves in their ends, a reinforcing ring lying in the grooves between two sections, said ring having inner beveled faces and the inner walls of the grooves being correspondingly beveled, means for drawing the sections toward each other to cause the beveled faces of the ring and grooves to coact to compress the ends of the sections, and cement in the joint between the ends of the sections embedding the said ring, the inner walls of the cylindrical sections at their ends being internally unconfined to permit said compression of the ends.

5. A reinforced concrete pipe comprising a plurality of sections, the end of each section having a portion formed with an annular conical face, a reinforcing ring encircling the two adjoining conical faces of adjacent sections, and means forcing said sections toward each other to cause the ring to compress the ends, the inner walls of the sections at their ends being internally unconfined to permit said compression of the ends.

VLADIMIR V. MESSER.

Witnesses:

CARL H. PAFENBACH,
J. D. THOMPSON.