Dec. 10, 1940. N. D. WHITMAN 2,224,419

METHOD OF MAKING CONCRETE PIPE

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Fig. 1.

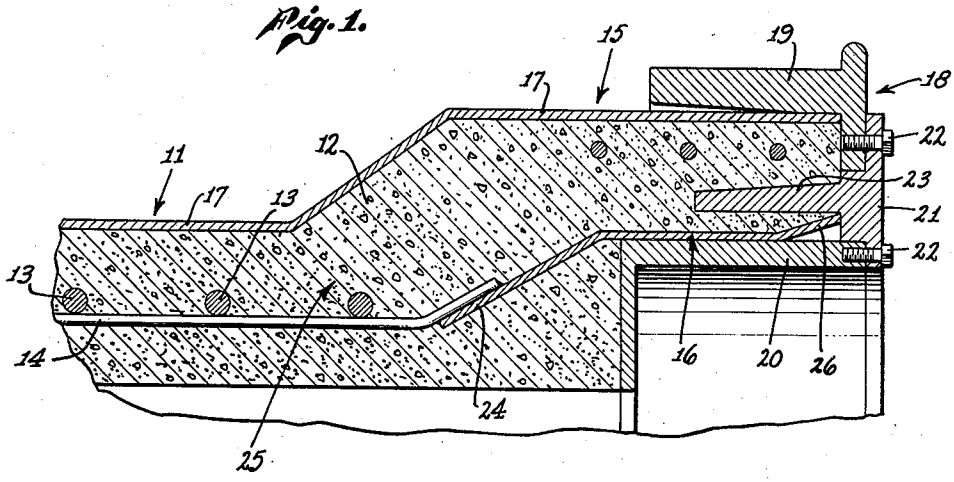


Fig. 2.

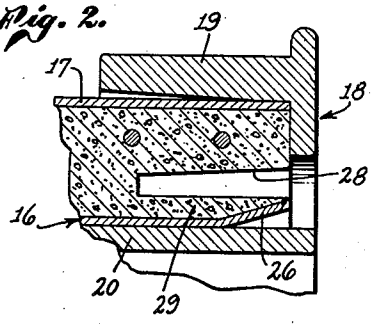


Fig. 3.

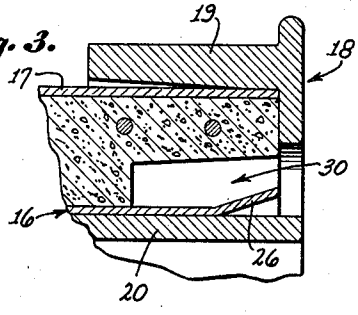


Fig. 4.

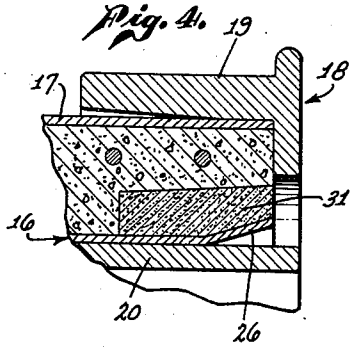
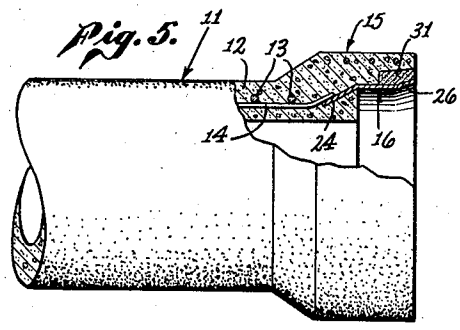


Fig. 5.



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Fig. 6.

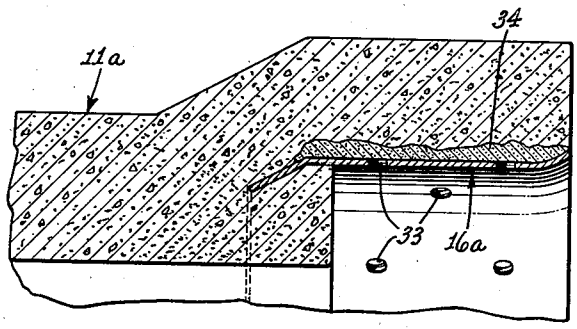


Fig. 7.

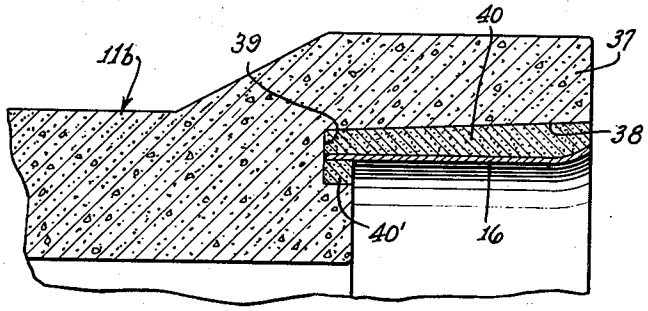
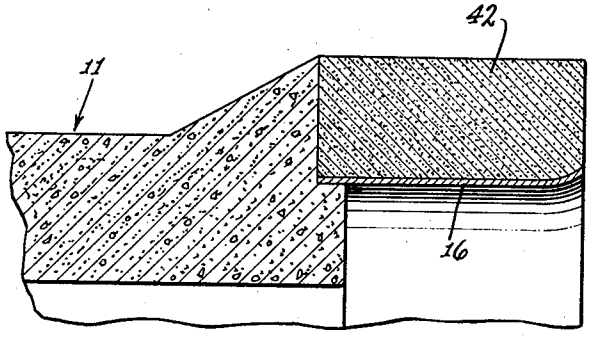


Fig. 8.



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UNITED STATES PATENT OFFICE

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METHOD OF MAKING CONCRETE PIPE

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Application May 22, 1939, Serial No. 274,886

6 Claims. (Cl. 25—154)

This invention relates generally to centrifugally spun concrete pipe.

It is a primary object of this invention to provide a centrifugally spun concrete pipe having a bell at one end and having an annular metal member forming the inner wall of the bell end of the pipe which is impervious or leak-proof. It is also an object of this invention to provide a method of producing a pipe of the type heretofore indicated so as to insure the imperviousness of the pipe in the region between the annular metal member and the outer wall of the bell end of the pipe.

In casting centrifugally spun pipe a form is provided into which the concrete is introduced and the form is spun or rotated to force the concrete outwardly and compact it against the inner surface of the form to produce a compact and dense pipe. It is desirable to provide the inner wall of the bell end of concrete pipe with a metal member or bell band so as to facilitate joining of pipes by means of rubber gaskets or the like. It has been found difficult to produce a centrifugally spun concrete pipe which is impervious or leak proof along the region of the annular member forming the inner wall of the bell end of the pipe. The reason for this is that the centrifugal force present during the casting process tends to force the cement and other ingredients of the concrete, with the exception of the water, outward against the form and at the same time tends to cause the water to move inwardly as it is the lighter of the ingredients. In forming a centrifugally spun pipe with an annular metal bell band as the inner wall of the bell, the water in the concrete moves inwardly toward the outer surface of the bell band and proceeds along its surface to the inner end thereof and then toward the inner surface of the pipe. This migration of accumulated water carries some of the cement with it producing a porous poor concrete in the region of the outer surface of the bell band which is to form the inner wall of the bell. It is also true that numerous intercommunicating voids are left in the region of the outer surface of the bell band by the centrifugal casting method. These voids together form an irregular annular space around the bell band making the pipe pervious in this region. Consequently the pipe tends to leak along the surface of this metal member as heretofore suggested.

In view of this, it is a particular object of this invention to provide a method and means for making centrifugally spun pipes having an inner annular metal bell band smooth and impervious or leak proof in the region of this band.

These and other objects will be apparent from the drawings and the following description thereof.

Referring to the drawings;

Fig. 1 is a fragmentary sectional elevation of a portion of the bell end of a concrete pipe and form;

Fig. 2 is a fragmentary sectional elevation of the bell end of the pipe with a section of the form removed after the pipe has been cast;

Fig. 3 is a fragmentary sectional elevation similar to Fig. 2 showing an enlarged channel formed by removal of concrete;

Fig. 4 is a fragmentary sectional elevation similar to Fig. 3 but showing the channel filled with mortar;

Fig. 5 is a fragmentary elevation broken away in part to show the completed pipe;

Fig. 6 is a fragmentary sectional elevation of the bell end of a pipe showing another form of bell band for use in another method of making the pipe impervious;

Fig. 7 is a fragmentary sectional elevation of a portion of the bell end of a pipe illustrating another form of the invention; and

Fig. 8 is a sectional elevation illustrating still another form of the invention.

More particularly describing the invention, reference numeral 11 generally indicates a pipe body which comprises concrete 12 provided with suitable circular reinforcement members 13 and with longitudinal reinforcements 14. At one end the pipe is provided with an enlarged portion which is commonly termed a bell, indicated generally by reference numeral 15. An annular metal member 16, which will be termed a bell band, forms the inner annular wall of the bell.

In Figs. 1–4 there has also been shown the forms in which the concrete is cast and spun. These forms comprise the outside form member 17 and a composite end form member 18. The end member 18 consists of an outer ring 19, an inner ring 20, and an intermediate removable ring 21 which is secured to the inner and outer rings by means of bolts 22. The ring 21 is provided with an inwardly extending flange 23 which will be referred to later. Any suitable means may be provided for detachably securing ring 19 to the side form 17.

To facilitate entrance of the concrete into that portion of the form which is to outline the bell end of the pipe 15 when the form is being spun, the inner end of the bell band 16 is pro-

vided with an inwardly converging portion 24. This end portion 24 of the bell band 16 is extended inwardly into the body of concrete forming the pipe body. The longitudinal reinforcement members 14 may be welded to the bell band as shown. With this construction an ample throat or passageway 25 is provided to facilitate passage of concrete under the influence of centrifugal force into the end of the form outlining the bell of the pipe. At its outer end the bell band 16 is preferably, though not essentially, provided with an outwardly flared portion 26 which is designed to facilitate the joining of pipe sections.

It is a particular object of this invention to provide means for insuring the imperviousness of the concrete in the region adjacent the outer surface of the bell band. Since the concrete is to some extent pervious or at least less dense in the region immediately adjacent the outer surface of the bell band for the reasons previously explained, it is desirable to provide means for sealing the pipe in this region. Accordingly, an inwardly extending flange 23 is provided on ring 21 in order to produce an annular channel 28 (see Fig. 2) adjacent the outer surface of the bell band 16. The flange is tapered to facilitate removal from the concrete. In the method of this invention the concrete pipe is first formed or cast in the forms shown in Fig. 1, after which the removable ring 21 is removed, leaving the channel 28 formed in the end of the bell. After the ring 21 has been removed the concrete indicated by reference numeral 29 in the region between the bell band 15 and channel 26 (Fig. 2) is removed either by a suitable tool or by water or air under pressure. This operation is preferably performed when the concrete of the pipe is still green, that is before it has been cured. This operation produces an enlarged channel which is generally indicated by reference numeral 30 in Fig. 3. The channel is subsequently filled with a sealing material 31 as shown in Fig. 4 and 5. In the making of ordinary centrifugally spun pipe it has been found adequate to use a rich cement mortar to fill or calk this enlarged channel 30 in order to insure the imperviousness of the bell end of the pipe. After the channel 30 has been filled the pipe and calking may be cured in any ordinary manner.

It is to be understood of course that the provision of an inwardly extending flange 23 on the end form 19 is only one means of facilitating the provision of the channel 30 and it is conceivable that the entire channel 30 may be formed by a suitable cutting tool or by the use of liquid or air under pressure acting against the green concrete.

Referring to Fig. 6 the pipe 11*a* has been shown as being provided with an apertured bell band 16*a*. In this form of the invention the bell band 16*a* is formed with a plurality of threaded openings 33 which are utilized for the introduction of cement under pressure to fill any voids or spaces behind the bell band 16*a*. As hereinbefore pointed out the centrifugal process of making the pipe may result in the formation of numerous voids behind the bell band which together form an irregular substantially annular unfilled space around the bell band. The method of making the pipe impervious in this form of the invention comprises first, spinning the pipe with the apertured bell band therein and subsequently introducing cement under pressure through the various apertures 33 by means of any suitable conduit means in order to fill the voids and provide what will necessarily be an irregular substantially annular body of cement 34 surrounding the bell band 16*a*. It is not essential to the invention that the apertures 33 be provided with screw threads and they may be eliminated or replaced by some other attachment means.

In Fig. 7 another form of the invention is shown wherein the pipe, indicated by reference numeral 11*b*, is centrifugally spun with a bell 37 which has a greater internal diameter than the completed pipe. The pipe is also spun with a groove 39. Suitable forms may be used to obtain the desired shape although the forms have not been shown. After the pipe is spun the bell band 16 is placed in position and packed in the end of the pipe with cement or a rich mortar 40 and 40'. This construction provides a bell on the end of a centrifugally spun pipe which is impervious and which has the feature of the metal bell band.

In Fig. 8 there is illustrated another form of the invention wherein the bell end of the pipe is formed without the portion 42. The portion 42 is subsequently formed by packing a rich cement mortar into the form around the bell band in order to provide an impervious construction in the region of the bell band 16.

Although the invention has been particularly described and illustrated it is to be understood that certain changes and modifications might be made and it is intended to cover such changes as may come within the scope of the appended claims.

I claim as my invention:

1. The method of making a centrifugally spun concrete pipe having a bell, having an annular metal bell band forming the inner wall of said bell, and having an unfilled space in the annular region immediately surrounding said bell, impervious in the region of said bell which comprises packing cement in said space between said bell band and the concrete body of said pipe to form a substantially annular body of cement which is impervious to liquid encircling said bell band.

2. The method of making a centrifugally spun concrete pipe having a bell and having an annular metal member forming the inner wall of said bell impervious in the region of said bell which comprises forming an annular channel in the end of said bell adjacent said metal member, and filling said channel with a sealing material.

3. The method of making a centrifugally spun concrete pipe having a bell and having an annular metal member forming the inner wall of said bell impervious in the region of said bell which comprises forming an annular channel in the end of said bell adjacent said metal member, and filling said channel with a rich cement mortar.

4. The method of making centrifugally spun concrete pipe having a bell at one end and having an annular metal member forming the inner wall of said bell which comprises providing form members in which to cast the pipe, one form member at the bell end of said pipe having an internal annular flange adjacent to and surrounding the annular metal member and extending inwardly of the outer end thereof, casting the pipe by introducing concrete into the form members and rotating said form members, removing the form members at the bell end of the pipe, removing concrete between said annular member and annular channel in the bell end

of said pipe formed by the flange of said end form member thereby enlarging said channel, and filling said channel with a cement mortar.

5. The method of making a centrifugally spun concrete pipe having a bell having an annular metal member forming the inner wall of said bell and having voids in the annular region immediately surrounding said bell, impervious in the region of said bell which comprises providing apertures in the annular metal member, and introducing cement through said apertures under pressure to form an irregular annular body of cement engaging the metal member and filling said voids.

6. The method of making a centrifugally spun concrete pipe having a bell, having an annular metal bell band forming the inner wall of said bell, and having an unfilled space in the annular region immediately surrounding said bell, impervious in the region of said bell which comprises packing a sealing material in said space between said bell band and the concrete body of said pipe to form a substantially annular body which is impervious to liquid encircling said bell band.

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