

May 17, 1927.

1,628,933

A. E. TROIEL

METHOD OF GROUTING

Filed Nov. 11, 1925

2 Sheets-Sheet 1

Fig. 1.

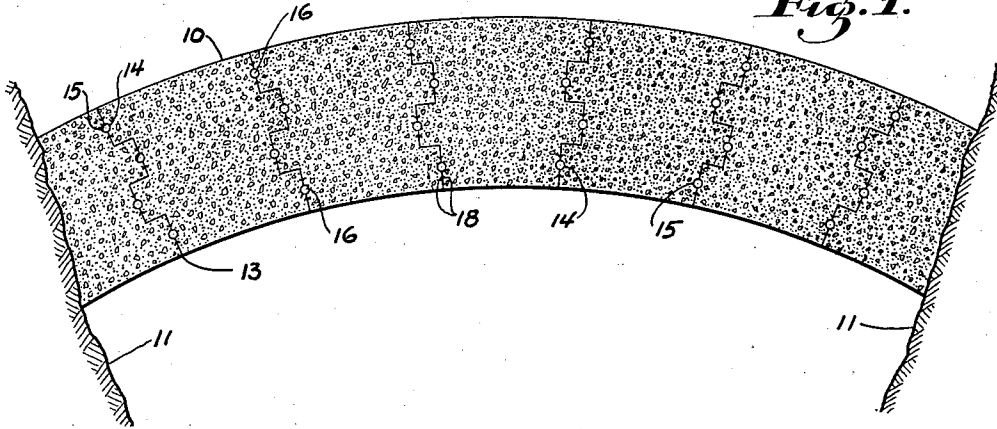
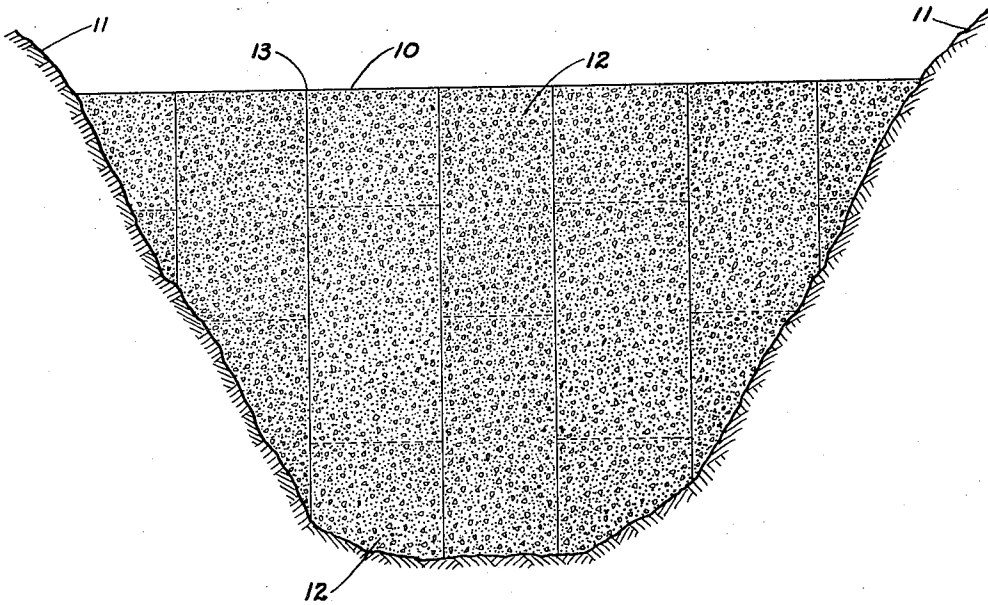


Fig. 2.



INVENTOR.

Arthur E. Troiel.

BY *Dewey, Strong, Townsend & Loftis*
ATTORNEYS.

May 17, 1927.

1,628,933

A. E. TROIEL

METHOD OF GROUTING

Filed Nov. 11, 1925

2 Sheets-Sheet 2

Fig. 3.

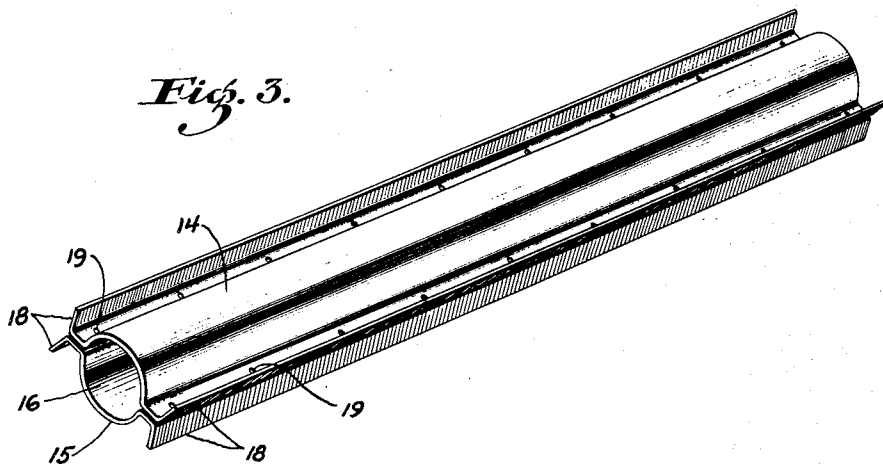


Fig. 4.

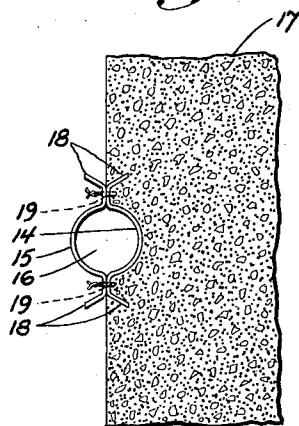


Fig. 5.

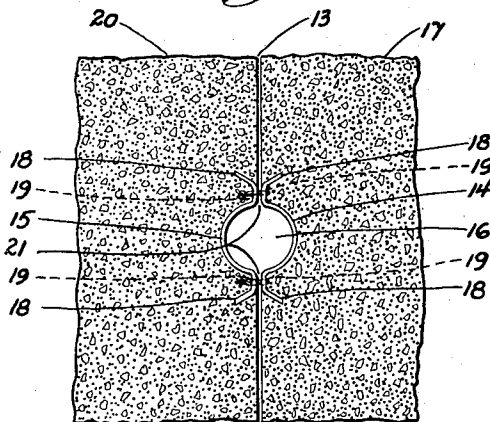
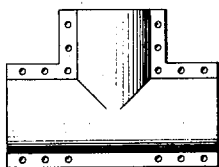


Fig. 6.



INVENTOR.
Arthur E. Troiel.
BY *Dwight Strong, Innes and Loftis.*
ATTORNEYS.

Patented May 17, 1927.

1,628,933

UNITED STATES PATENT OFFICE.

ARTHUR E. TROIEL, OF BERKELEY, CALIFORNIA.

METHOD OF GROUTING.

Application filed November 11, 1925. Serial No. 68,272.

This invention relates to a method of constructing concrete dams and the like in adjacent units and thereafter grouting the space formed between such units by their shrinkage. In dams and other concrete constructions formed by pouring such constructions in adjacent units, such adjacent units shrink in a manner forming a crack or space therebetween. The filling of this space with cement after the hardening of the dam is called "grouting". This grouting has been accomplished heretofore in various ways. One way has been to provide long grouting pipes between such units, when pouring the units, which pipes are slotted at intervals throughout their length in alignment with the joint between the two units, the slots being covered over with cloth or other suitable material to prevent the entrance of the concrete into the pipes. When the dam has hardened in a manner forming a space between the units, the grouting material is forced under pressure into these pipes through other pipes extending thereinto. This pressure is intended to break open the slots and force the grouting material therethrough and into the space between the units. Indications however show that, due to various causes, this system is far from satisfactory. Some of these causes may be as follows. The interspacing of the slots leaves voids therebetween. The cloth or covering may break and let the cement fill the slots and it may be impossible to break open some of the slots through the cloth. Due to various causes therefore, this system is obviously only partially efficient.

My invention herein contemplates the use of a form or forms so arranged in the concrete units at their adjacent faces as to form an elongated conduit or conduits therebetween into which the concrete cannot enter when pouring the same, but which forms will separate with the units when the concrete hardens and thereby leave each conduit with a continuous slot-like opening along each side thereof into the space between the units. Grouting pipes can thereafter be inserted into such conduit and grouting material forced thereinto and outwardly into the space between the units through the said continuous slots. The details of my improved method and the form for carrying same into effect will be hereinafter described.

In the accompanying drawings I have illustrated certain specific embodiments where-

by my invention may be carried out, but it will be understood that the invention can be otherwise embodied and that the drawings are not to be construed as defining or limiting the scope of the invention, the claims appended to this specification being relied upon for that purpose.

Referring to the figures of the drawing:

Figure 1 is a diagrammatic plan view of a dam formed in units.

Figure 2 is an elevation thereof.

Figure 3 is a perspective view showing one type of twin forms which I may employ.

Figure 4 is a fragmentary view showing the position of my forms when one unit has been poured and the adjacent unit is about to be poured.

Figure 5 shows the same after the units have hardened and shrinkage thereof has taken place.

Figure 6 is an elevation of a half section of a T form which may be employed when horizontal grouting pipes are used.

By way of example in Figs. 1 and 2, a dam 10 is illustrated as formed between canyon walls 11, the dam being formed in the usual manner in units or sections 12. The dam is formed in units vertically as well as horizontally, as illustrated in dash lines in Figure 2. The shrinkage of the dam upon the hardening of the cement causes spaces to form at the junction 13 between the adjacent units. The purpose of the present invention is to provide an improved method of grouting or filling these spaces with cement.

In Fig. 3 I have illustrated a pair of grouting form sections 14 and 15. These sections when joined in face contact form a continuous conduit or passage 16 therebetween. While in the drawing I have shown these form sections as half round whereby together they form a cylindrical passage 16, it will be understood that these sections may be of any cross sectional shape and of any length desired. In practice I preferably employ the sections in approximately ten foot lengths and join the same in end to end relation to provide a conduit of any length as will be understood.

When pouring the first unit 17 (Figs. 4 and 5) I mount the section 14 within the main wall form in such a manner that concrete flows therearound and over the relatively angular ends 18 in a manner securely binding the section within the face of the

unit. After this unit has hardened and the main wall form is removed, I mount the section 15 loosely on but in direct contact with the section 14 in the manner illustrated in Fig. 4, the sections being provided with holes 19 therein for this purpose. The unit 20 is then poured and binds the section 15 within its face in the manner illustrated. Upon the setting and hardening of the dam the shrinkage of the units will cause the same to form the space 13 therebetween and since the sections 14 and 15 are a part of such units, these sections will be separated as illustrated in a manner forming a continuous space 21 therebetween along opposite sides thereof and leading into the spaces 13 between the units.

The grouting is performed during cold weather when the shrinkage of the dam is the greatest. Long pipes are inserted into and extend to near the bottom of the conduits 16. Water is ordinarily first run through these pipes to fill up the spaces 13. Liquid cement is thereafter forced through the pipes under pressure. This cement is heavier than water and is forced into the spaces 13 to displace the water which, being forced upwardly, overflows the top of the conduits 16.

It will be understood that the sections 15 are so loosely mounted on the sections 14 that the two sections separate with the separation of the units 17 and 20 as shown in Fig. 5, thereby leaving a one hundred per cent slot or opening at each opposite side of the conduit into the spaces 13. Such an opening assures perfect grouting of these spaces. The horizontal joints as well as the vertical joints may also be grouted by providing horizontal grouting conduits from the vertical conduits by means of T's such as illustrated in Figure 6.

When mounting the section 15 on the section 14, I preferably heavily grease the contacting surfaces of these sections. This grease aids considerably in preventing the concrete or any moisture or liquid therefrom, from seeping into the conduit 16.

Having thus described my invention, what I claim is:

1. A method of constructing concrete dams and the like in adjacent units and thereafter grouting the space between such units, consisting of securing a form to the exposed face of the poured unit in a position whereby the adjacent unit will be poured therearound and connected thereto, the shape and arrangement of the form be-

ing such as to provide a conduit between the two units, pouring the second unit and permitting the same to set and thereafter grouting the space between the units formed by their shrinkage by forcing liquid cement into the conduit and outwardly therefrom into the said space.

2. A method of constructing concrete dams and the like in adjacent units and thereafter grouting the space between such units, consisting of providing a form in the exposed face of the first unit poured, providing a cooperating form in the adjacent face of the adjacent unit, the shape and arrangement of the forms being such as to provide a conduit therebetween and between the two units, pouring the second unit and permitting the same to set and thereafter grouting the space between the units formed by their shrinkage by forcing liquid cement into the conduit and outwardly therefrom between the two forms into the said space.

3. A method of constructing concrete dams and the like in adjacent units and thereafter grouting the space between such units, consisting of providing a form in the exposed face of the first unit poured, such form having a portion providing an elongated open recess within the face of the unit, providing a cooperating form in the adjacent face of the adjacent unit, such two forms providing a conduit therebetween and between the two units, pouring the second unit and permitting the same to set and thereafter grouting the space between the units formed by their shrinkage by forcing liquid cement into the conduit and outwardly therefrom between the two forms into the said space.

4. A method of constructing concrete dams and the like in adjacent units and thereafter grouting the space between such units, consisting of providing a form in the exposed face of the first unit poured, mounting a cooperating like form on the first said form, pouring the adjacent unit therearound, the cooperating recesses of the two forms providing a conduit therebetween and between the two units, pouring the second unit and permitting the same to set and thereafter grouting the space between the units formed by their shrinkage by forcing liquid cement into the conduit and outwardly therefrom between the space formed by the separation of the forms, which forms are secured to their respective units, and into the space between the units.

ARTHUR E. TROIEL.