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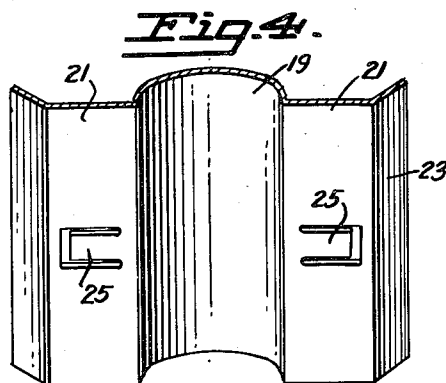
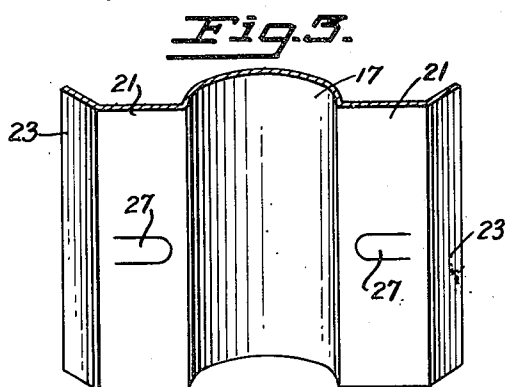
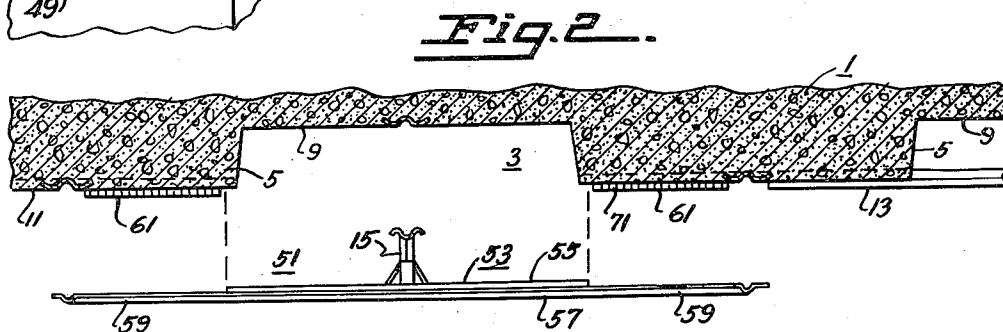
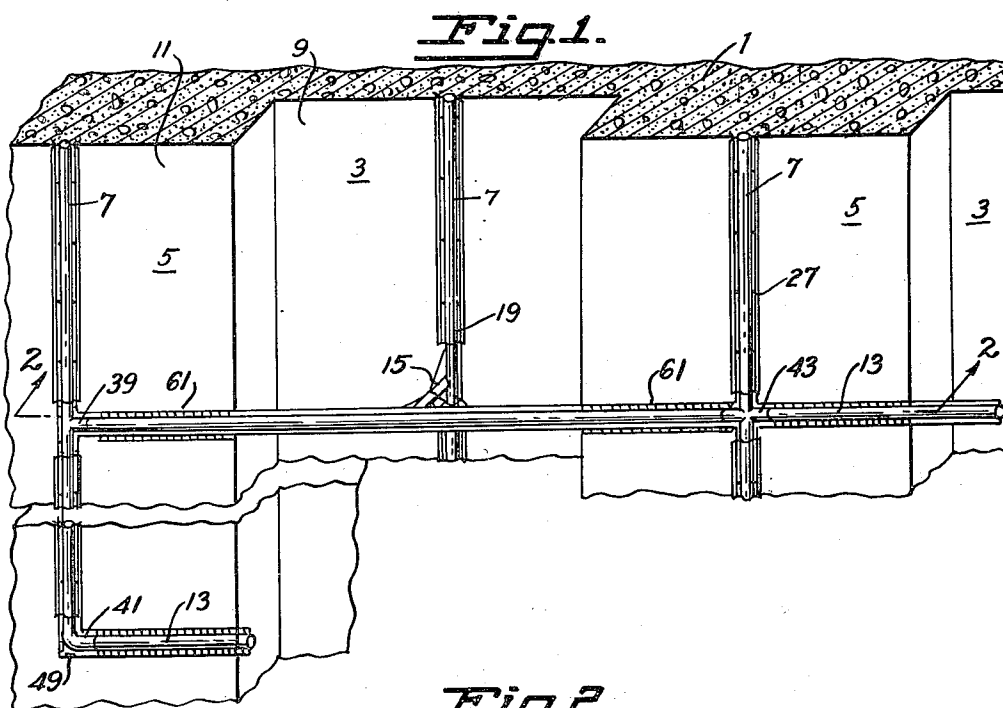
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2,585,192

CONCRETE STRUCTURE AND GROUTING ASSEMBLY

Original Filed Jan. 26, 1942

4 Sheets-Sheet 1



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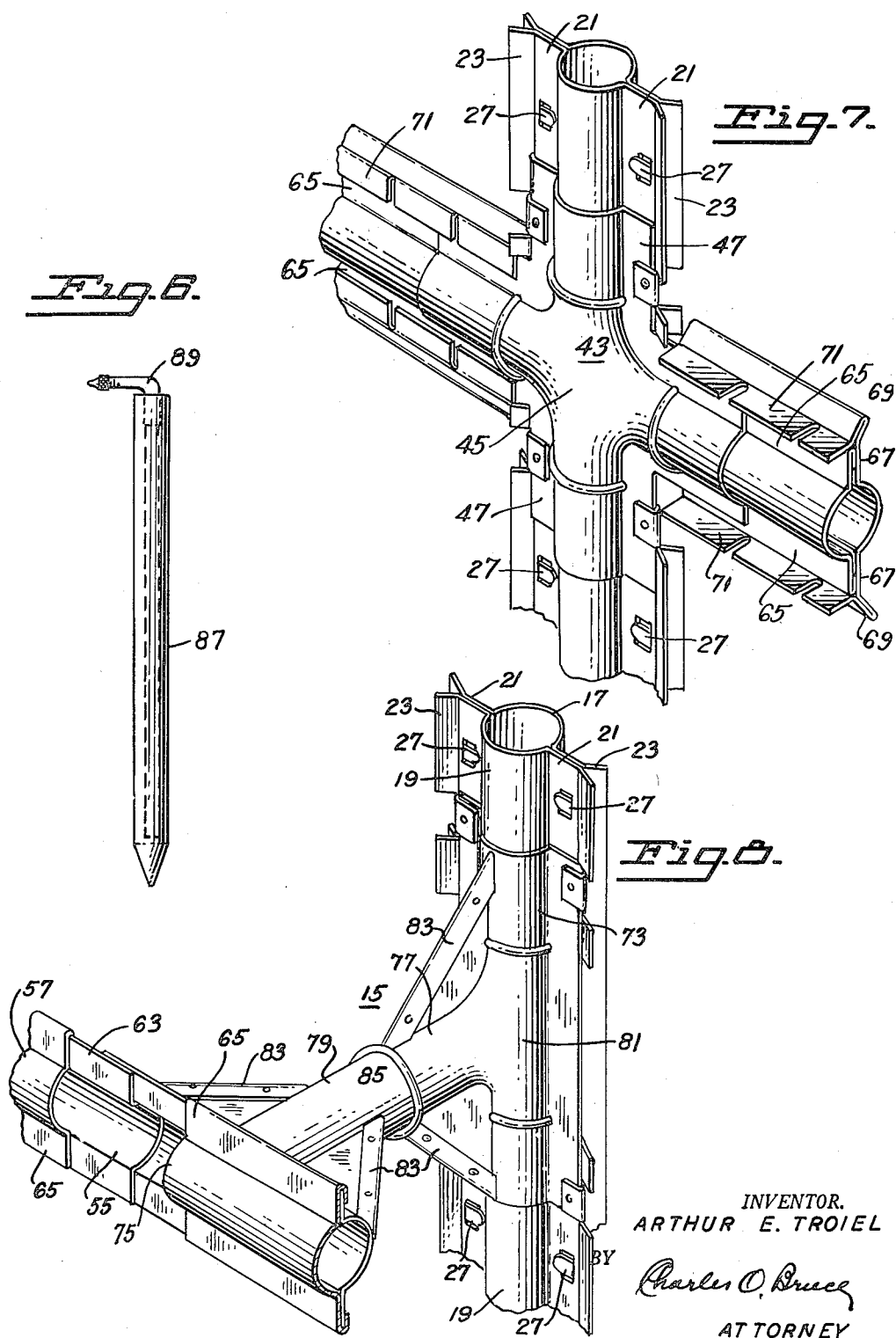
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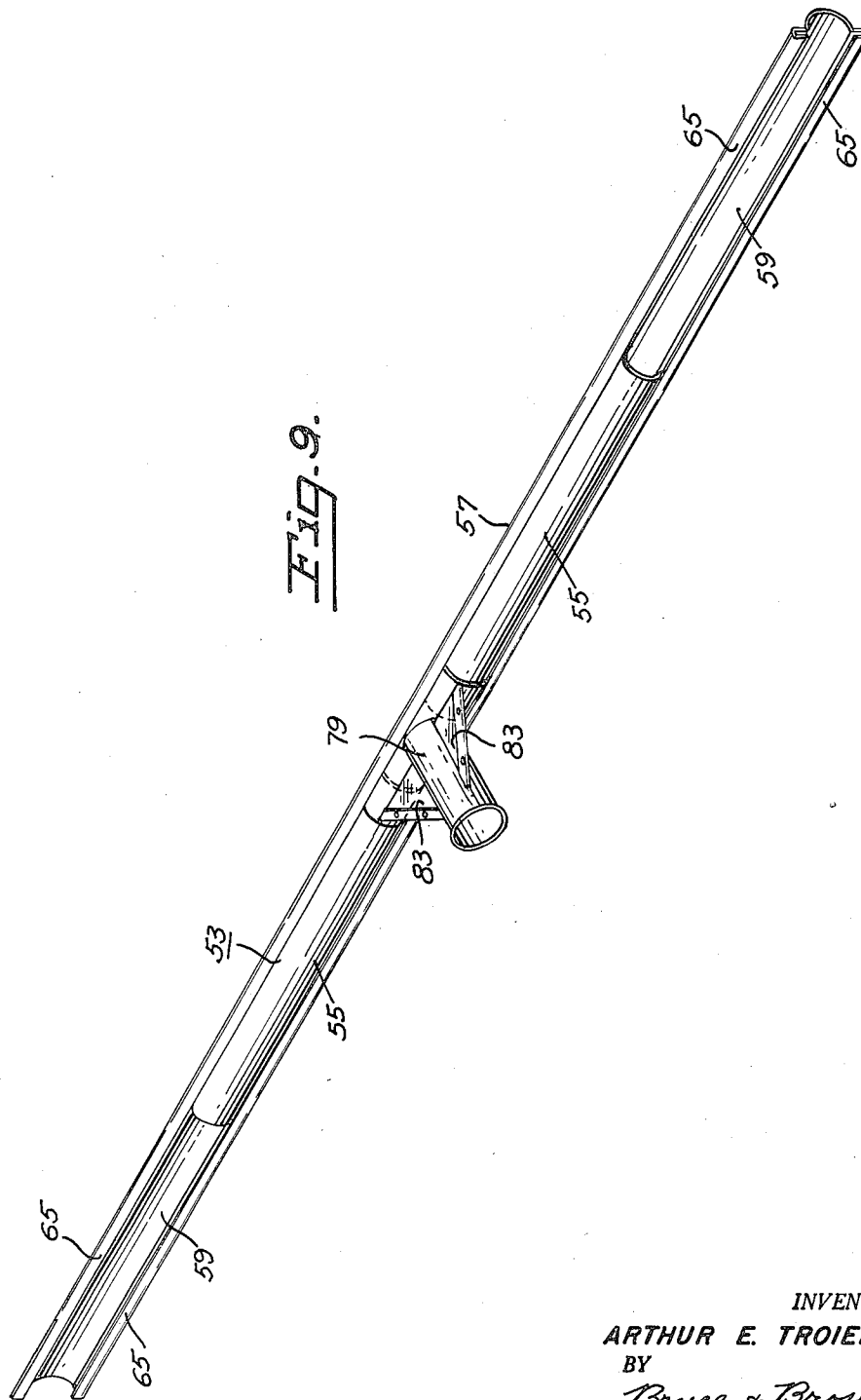
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CONCRETE STRUCTURE AND GROUTING ASSEMBLY

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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,585,192

CONCRETE STRUCTURE AND GROUTING
ASSEMBLY

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Original application January 26, 1942, Serial No. 428,148, now Patent No. 2,411,011, dated November 12, 1946. Divided and this application July 29, 1946, Serial No. 687,043

2 Claims. (Cl. 72-0.5)

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This application is a division of my application for Means and Method of Grouting, Serial No. 428,148, filed January 26, 1942, now Patent Number 2,411,011 of November 12, 1946.

My invention relates to means for grouting spaces developing between adjacent walls of large concrete structures by their shrinkage, and more particularly comprises an improvement upon the subject matter of my patent for Method of Grouting, No. 1,628,933, of May 17, 1927.

Large concrete structures, such as dams or the like, are according to present practice, constructed in units. Alternate units each extending the complete thickness of the dam, are first poured, and when sufficiently solidified, intermediate units are then poured. The units are formed with side walls of irregular outline to bring about an interlocking of the units in the finished structure.

To accomplish the filling in of the space developing between any two adjacent units upon shrinkage of the same, a system of piping is built into the structure between such units during the construction of such structure, such piping being so designed as to open into the inter-unit spacings and thereby enable liquid concrete, which is poured into the piping, to flow between these units and fill in the spacing therebetween. Preferably at various elevations, the vertical pipes between such units are interconnected by horizontal pipes, to assure complete filling of the spacings between these units.

In accordance with the teachings of my earlier patent above referred to, the pipes are formed of longitudinal half pipe sections, with longitudinal, laterally extending flanges and integrally formed anchoring rims. The two half pipe sections are loosely held together by means of loops of wire through the lateral flanges with the free ends thereof twisted together and are so installed between adjacent dam units, with the anchoring flanges embedded in such units. As a result of shrinkage, the half pipe sections are pulled apart thereby opening the pipe seams to establish communication to the inter-unit spacings formed between units by such shrinkages.

My invention serves to improve upon the system of my earlier patent, not only in the matter of facilitating the assembling of the grout pipes, but in many other respects.

Among the objects of the present invention are to provide a novel and improved grouting system; to provide a novel and improved pre-formed unit assembly for installation in a grout-

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ing system; to provide a novel and improved grouting system unit assembly which will facilitate the installation of a grouting system and bring about an improved system installation.

5 Additional objects of my invention will be brought out in the following description of the same taken in conjunction with the accompanying drawings wherein—

Figure 1 is a fragmentary view, in perspective, 10 of a dam showing a portion of a grouting system installation to which my invention pertains.

Figure 2 is a view, in section, along the line 2-2 of Figure 1, with a pre-assembled section of the system shown in disassembled relationship 15 to the system.

Figures 3 and 4 are complementary half pipe sections, from which the vertical grout pipes are fabricated.

Figures 5-A to 5-D, inclusive, are views in 20 section, illustrating the manner of assembling the half pipe sections in the fabrication of the vertical grout pipes, and the manner in which they function.

Figure 6 is a view depicting an expansible plug 25 utilized in the installation of the grout system in a concrete structure.

Figures 7 and 8 are perspective views of fixtures utilized in the building of a grout system.

Figure 9 is a three-dimensional view depicting 30 details in the assembly of Figure 2.

Referring to the drawings for a complete and detailed description of the features of my invention, Figure 1 shows an outline of an incomplete portion of a dam structure 1, looking 35 at the irregular side wall of a unit. Such irregular wall involves a number of spaced bays 3 and columns 5 for interlocking with an adjacent unit, to be subsequently poured. The portion of the grouting system illustrated therein comprises a plurality of vertical pipes 7 extending up the bay walls 9 and column walls 11. The column wall pipes are interconnected at various levels by horizontal pipes 13; and communication fittings 15 serve to joint the bay wall pipes to the 45 horizontal pipes of the system, thereby effecting communication to all points in the grouting network between concrete units, from any one pipe.

The vertical pipes are designed to provide communication with the spacing between concrete units upon shrinkage of such units, and to this end, are formed of half pipe sections 17 and 19, preferably of semi-cylindrical contour. Each half pipe section is formed with longitudinal, laterally extending flanges 21 which are bent 55 back at an angle along an intermediate line

thereon to provide anchoring rims 23. At spaced intervals along each of the flanges of one of the half pipe sections 19, the flange is provided with U-notches, leaving a laterally directed tab 25 at each such interval in the plane of the flange. At corresponding points along the flanges of the other half pipe section 17, tabs 27 are struck therefrom, directed toward the semi-cylindrical portion of the half section.

The assembling of the two half sections takes place as follows: Prior to the pouring of a concrete unit, one of the half sections 17 is attached at the proper location, to the inside surface of one of the walls 29 of a form, and the concrete is then poured into this form and fills in around this half pipe section and its anchoring rims 23.

To properly position and center the half pipe section in question, I have found it very convenient to provide a half round wood mold 31 (Figure 5-A) on the inside surface of the form wall 29, of a size which will just about fill the half section, and nail the half pipe section thereto. A specially designed affixing means is provided for this purpose. It comprises a small plate 33 having one edge curved to fit the curvature of the half pipe section. The plate is punched to provide a pair of aligned offset openings 35 to receive a suitable nail 37. After the concrete has hardened sufficiently to retain itself and hold the half pipe section firmly anchored therein, the form is removed, and the exposed nail points are snipped off. The other half section 19 of the pipe is then attached to that half section 17 which has already been fixed to the wall of the first unit. To accomplish this, the struck tabs 27 are bent outwardly (Figure 5-B) to a position normal to the flange from which they are struck, and the remaining half section of pipe is applied into position with the bent-up tabs extending through the U-slots, following which, the protruding tabs are creased over against the tabs 25 (Figure 5-C). In this manner the two sections of the vertical pipe are securely held in close contact and in position for the pouring of the adjacent unit.

At this point, it is of importance to note that while the locking means just described permits of positive holding of the two half sections of the pipe together and in close contact, it, desirably, does not offer a great deal of resistance to the separation of the half pipe sections during shrinkage of the adjacent concrete units to which the half pipe sections are held, and this is so, by reason of the fact that the tabs 25 will readily bend out of the plane of the flanges in which they lie, and accordingly reduce the resistance to separation of the half pipe sections. Through such separation, communication with the spacing between adjacent units of the concrete structure, is established throughout the complete length of the vertical pipe. In a sense, therefore, the interlocking tab structure may be said to weakly hold the two half pipe sections in positive engagement when assembled.

As the dam structure rises in height and it becomes desirable to provide horizontal pipe connections between these vertical pipes supported on the columns 5, I insert at those points in the building up of the vertical pipes, a T, L or + fitting, indicated by reference numerals 39, 41 and 43 respectively, of Figure 1, depending on the location of the vertical pipe in any group, and join to these horizontal pipes, the remaining vertical pipes, through the use of the special communication fittings 15.

The fittings, whether of T, L or + type, except for their shape, are somewhat similar in construction and are formed of half pipe sections 45, each provided with laterally extending flanges 47. Further description will be with reference to the + fixture of Figure 7.

A permanent locking of the two half sections is effected by the manner in which the pipes are joined to the fixture. With respect to a vertical pipe 7, the end thereof is positioned into one end of the fixture, with its lateral flanges 21 between the fixture flanges 47. The extent to which these vertical pipes may be inserted into the fitting openings may, if desired, be predetermined by rolling a groove into each vertical end of the fitting at a properly spaced distance. Following the positioning of the vertical pipe in the manner indicated, the anchoring rims 23 may be snipped with a pair of shears, and crimped over the flanges of the fitting to hold components of the fitting together. By then center punching the crimped portions, the vertical pipe is conveniently restrained from sliding or shifting in the fitting.

Where space exists, as at the corner 49 in the L-type fitting 41, a portion of the flange of one half section may be crimped to receive the adjacent portion of the flange of the other half section at the time of assembly.

The horizontal pipes are attached in much the same manner as the vertical pipes, but in as much as they differ structurally from the vertical pipes, they will be described before indicating in detail the manner of attaching the same to the fittings.

While the horizontal pipe structure might be the same throughout the grouting system, I have found it convenient and more economical in time and labor to pre-assemble certain portions of the horizontal piping into assembled units, and install them as such. A unit 51 of this character is illustrated in Figure 2 and includes a complete pipe portion 53 formed of two half sections 55 and 57, and of a length adapted to reach across a bay, a communicating fixture 15 as illustrated in detail in Figure 8, and half pipe extensions 59 at either end adapted to be locked to complementary half pipe sections 61 which have previously been anchored to the face of a column. The half pipe section 55 is formed with a lateral flange 63 (Figure 8), while the other, 57, is formed with a lateral flange 65 which has been crimped to receive the other. These half pipe sections may be assembled by sliding one over the other.

The horizontal half pipe sections 61 to which the unit assemblies are attached, are formed with lateral flanges 67 (Figure 7) and an integral anchoring rim 69 along each flange. Each anchoring rim, however, is crimped and provided with an overhanging edge which is cut to form a plurality of deformable locking tabs 71. The extending half pipe sections 59 of the unit assembly 51 are applied to the anchored half pipe sections 61 and locked thereto by turning the locking tabs 71 down against the flanges 65.

The end of the pipe so formed is fixed between the halves of the fixture 43 and held therein by bending the adjacent locking tabs 71 over a flange of the fixture, and then center punching the same, if found desirable.

The communication fixture is illustrated in detail in Figure 8 as comprising a vertical T 73 and a horizontal T 75, with the stem 77 of the vertical T telescoping the stem 79 of the horizontal T. Each T includes a pair of half T sections 81 re-

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inforced with integral gussets 33, and fitted together by pre-crimping the edge of the gussets of one half T section to receive the gussets of the other half T section. By center punching the interfitted edges of the gussets, the assembled half T sections may be secured together against displacement. An external head 35 rolled in the stem of the vertical T serves as a stop in assembling the two T's to form the communication fixture 15. This fixture is embodied into the grouting system by fitting the cross bar portion of the vertical T to a vertical pipe in much the same manner as the + fitting previously described, and fitting the cross bar of the horizontal T to the horizontal pipe 53, as one would a half pipe section 55.

A feature of my invention, aside from the assembling of the pipe components, resides in the method of maintaining such pipes clean and free of concrete during the pouring of the concrete units. In the absence of any precaution, such concrete might have a tendency to seep between the flanges 21 and into the vertical pipes 7. I effectively preclude such possibility of infiltration of material, by inserting a plug in the form of a rather heavy piece of rubber tubing 87, closed and tapered at one end, into that section of a vertical pipe against which the concrete is to be poured, and pump this tubing up to fill the interior of the pipe as indicated in Figure 5-C. To do this, I mount a valve 89, such as a bicycle valve, in the open end of the plug, to which a pump may conveniently be attached for the purpose. Following pouring and setting of the concrete about the pipe, the plug may be deflated to facilitate withdrawal of the same. The valve 89 or any suitable collar or handle may be relied on to prevent the plug from settling down into a pipe, when inserted therein.

It will be apparent from the above, that I have provided an improved grouting system which fulfills the objects of my invention as previously set forth. While I have described the same in detail, the invention may be susceptible to changes and alterations, without departing from the principles involved. I, accordingly, do not desire to be limited in my protection to the details disclosed, except as may be deemed necessary by the appended claims.

I claim:

1. In combination, a structure formed of con-

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crete units having interlocking adjacent walls including alternate bays and columns, and a unit assembly comprising a horizontal pipe extending across one of such bays at the outer extremity thereof, a longitudinal half pipe section extending from each end of said horizontal pipe along the face of the adjacent column and of a length substantially equal to half the width of said column, and a communication fitting extending into said bay from an intermediate point of said horizontal pipe and for a distance substantially equal to the depth of such bay.

2. In combination, a structure formed of concrete units having interlocking adjacent walls including alternate bays and columns, and a unit assembly comprising a horizontal pipe with permanently closed seams and extending across one of such bays at the outer extremity thereof, a longitudinal half pipe section extending from each end of said horizontal pipe along the face of the adjacent column and of a length substantially equal to half the width of said column, and a communication fitting extending from the middle of said horizontal pipe into said bay and for a distance substantially equal to the depth of such bay.

ARTHUR E. TROIEL.

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