Jan. 23, 1962 F. A. SMITH 3,017,722

COMBINATION HOLLOW FOOTING STRINGER AND FOUNDATION DRAIN DUCT

Filed Feb. 28, 1958 2 Sheets-Sheet 1

Fig. 1.

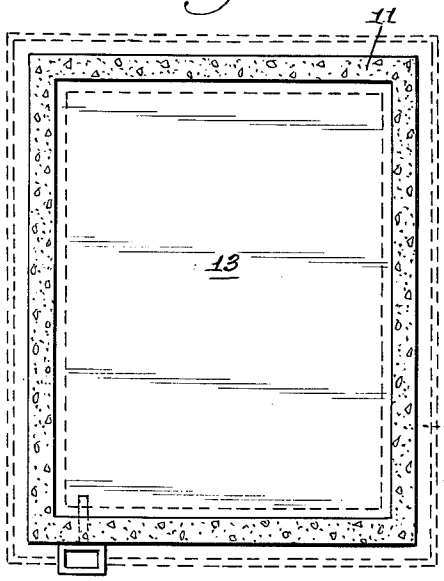


Fig. 3.

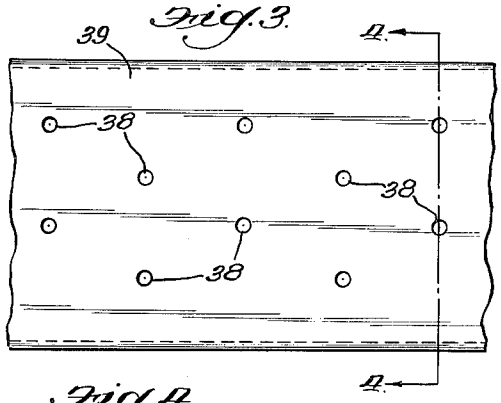
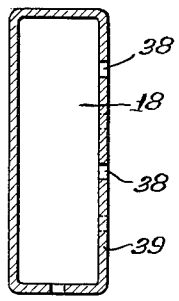


Fig. 4.



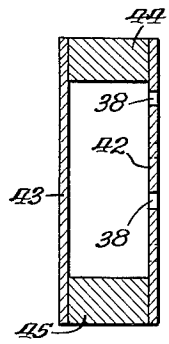


Fig. 5.

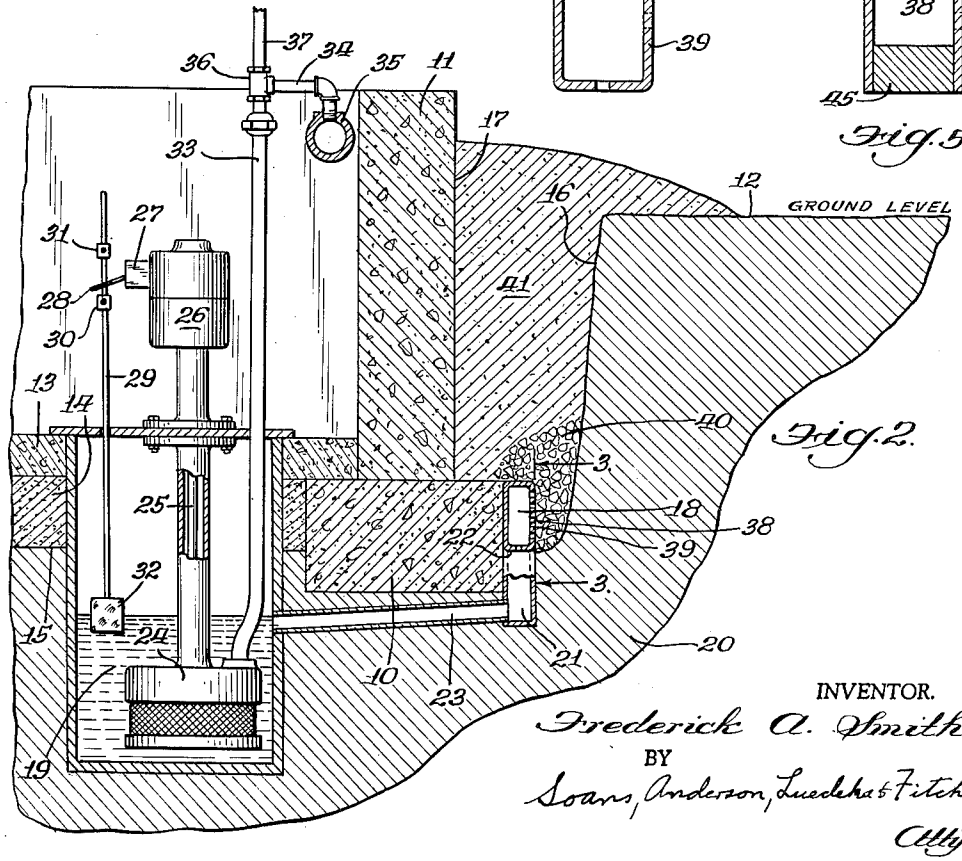


Fig. 2.

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Fig. 6.

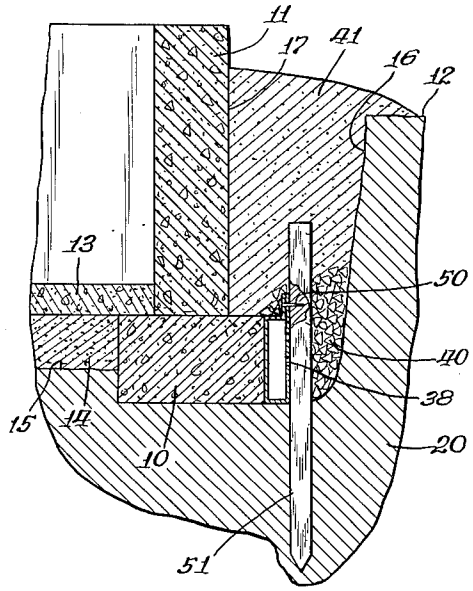


Fig. 7.

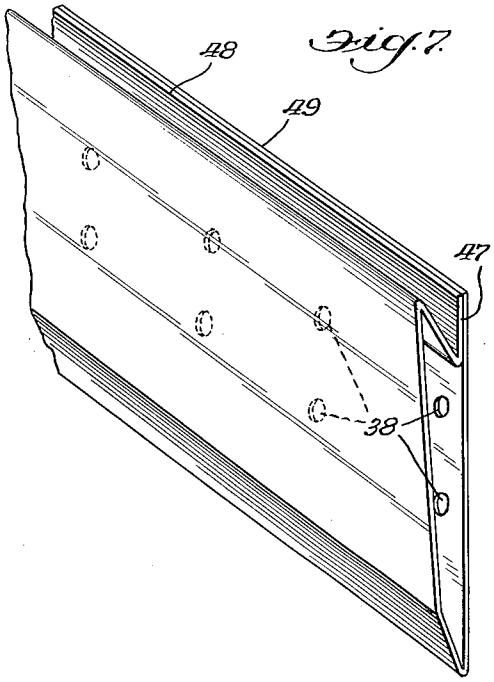


Fig. 9.

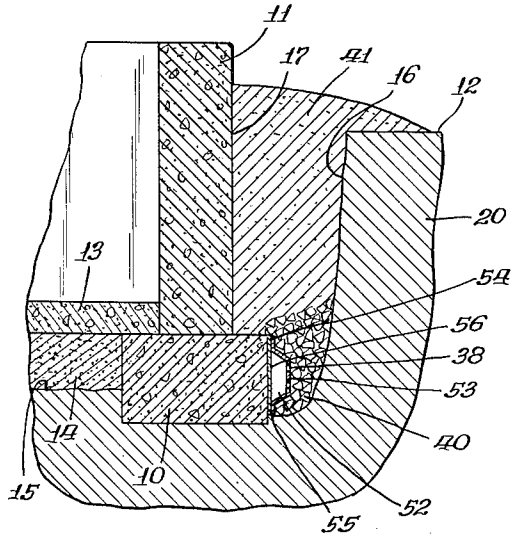
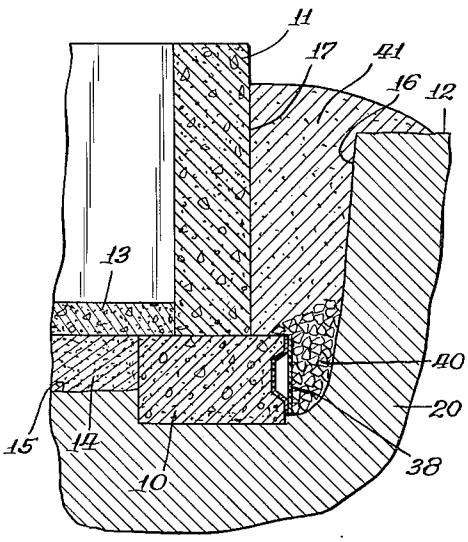


Fig. 8.



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COMBINATION HOLLOW FOOTING STRINGER AND FOUNDATION DRAIN DUCT

Frederick A. Smith, Homewood, Ill.

Filed Feb. 28, 1958, Ser. No. 718,339
1 Claim. (Cl. 50—100)

This invention relates to the construction of building foundations. It has its principal use in connection with the prevention of seepage of surface or ground water into crawl spaces or basements having areas located below ground level.

Usually the interior spaces of most buildings such as residences are constructed with an outer wall from six to twelve inches in thickness, resting upon a concrete footing which may be substantially wider than the width of the building wall and having a vertical depth or thickness of from six to twelve inches.

In the construction of the foundation of the building, it is customary to perform the operation in certain steps in proper sequence. The excavation is first dug out to the required depth, and of sufficient area to provide proper space in which to erect the forms for the footing. These forms are then installed and the footing concrete is poured. After the footing has set sufficiently, the form may be removed. Over the footing there is placed another form into which the concrete is poured to form the outer wall of the building foundation.

Also, especially where the basement or crawl space is a substantial distance below ground level so that there may be an accumulation of water under a head of pressure at the level of the footing, good building practice calls for the removal of this unwanted ground water (which term as used herein includes water seepage down through the ground or the back fill near the wall of the building, or water which comes from a more distant underground source) in order to prevent the unwanted ground water from entering the building by seepage through cracks in the floor or foundation, or through crevices between the foundation and the basement floor.

In such cases, where there is a possible accumulation of an excess amount of ground water, drainage ducts or pipes with open joints are placed around the outside or inside of the outer wall adjacent the footing. With some ground conditions, it is deemed advisable to place these drainage pipes around the outside. In other cases, the conditions are such that the pipes may be placed just inside the footing within the foundation and below the basement floor. In either case, whether the drainage tile is placed inside or outside of the basement wall, it is customary to place gravel or filler stone around and over the drain tile so that the ground water will flow into the tile. If there is then some way of disposing of it and thereby relieving the pressure, the ground water will not seep into the basement.

It is customary to lay the drain tile with a slight slope so that the water will flow to a low point where it enters the sump. From the sump, the water is conducted to a sewer or other discharge facility. If the sewer is not low enough and of capacity sufficient to prevent back-up, the water may be lifted by a suitable float-controlled pump before it is dumped into the sewer.

According to the normal and time-honored procedure, the footing form is installed, the footing is poured; then

the wall form is installed and the wall is poured. After the concrete has set, the forms are removed and the drain tile and stone filter are laid down. The foundation is then back filled with earth.

The principal object of this invention is to prevent seepage of ground water into the basement or crawl space of a building at a very slight increase of cost as compared with the procedure in which no provision is made for the removal of water seepage, and at a considerable saving of cost as compared with the use of the conventional drain tile method.

In the drawings accompanying this application and illustrating various embodiments of the invention,

FIGURE 1 is a plan view of a basement foundation wall and footing constructed in accordance with my invention;

FIGURE 2 is a vertical section through the completed foundation wall, showing an inside sump and associated equipment;

FIGURE 3 is an enlarged view in elevation taken on the line 3—3 of FIGURE 2;

FIGURE 4 is a section taken on the line 4—4 of FIGURE 3;

FIGURE 5 is a view similar to FIGURE 4, but showing a built-up conduit, the construction of which differs from that shown in FIGURE 4;

FIGURE 6 is a view similar to FIGURE 2, but showing the use of a conduit of a collapsible type;

FIGURE 7 is an enlarged, perspective view of a portion of the conduit shown in FIGURE 6, but collapsed for shipment to the job;

FIGURE 8 is a view similar to FIGURE 2, but showing another form of conduit; and

FIGURE 9 is another view similar to FIGURE 8, but showing a still different type of conduit construction.

Referring now to the drawings, **10** represents the concrete footing which constitutes a base for the bottom of the wall **11**, which, in the present instance, is the outside wall of the basement of a building. Usually the basement space is excavated below the ground level **12** and deep enough to allow for the concrete floor **13** and its base which consists of several inches of crushed stone, cinders or other similar material **14**, laid upon the unexcavated bottom surface **15** of the excavation.

The dimension of the excavated area is such as to provide a space between the unexcavated ground **16** and the outer face **17** of the wall **11**, this space being sufficient to enable the workmen to do the necessary operations in placing the forms and pouring the concrete for the footing. The footing **10** has a lateral width substantially greater than the thickness of the basement wall **11**. In the present instance, the combination drain duct and stringer **18** installed according to my invention, is located at the outside of the footing **10** while the sump **19** is located within the basement, it being understood that the duct **18** in certain instances, depending upon the porosity of the subsoil **20**, can be located inside instead of outside of the footing. However, where the ground upon which the footing **10** rests is mostly clay, it is considered good practice to locate the drain duct **18** on the outside of the foundation.

The drain **18** is preferably laid with a slight slope so that the water will flow to a low point convenient to the

sump 19. The unwanted ground water accumulating in the duct 18 flows into a header box 21 through a tapping outlet or discharge orifices in the lower wall 22 of the drain duct, and from the bottom of the header box 21, a pipe 23 conducts the water into the sump 19.

A float controlled pump in a housing 24 located near the bottom of the sump 19, is driven by means of the vertical shaft 25 of an electric motor 26. The operation of said electric pump motor 26 is controlled by a switch 27 having a rocking switch arm 28 apertured to serve as a guide for a vertical float rod 29 provided with adjustable collars 30 and 31 which are adapted to engage the arm 28 and actuate the switch 27 in the usual manner when the float rod 29 is raised or lowered by the float 32.

When the water in the sump 19 rises to a certain level, the lower collar 30 will rock the switch lever 28 upwardly and start the motor and pump. When the level of the water in the sump is sufficiently lowered, the float will drop and cause the upper collar 31 to depress the switch lever 28 and turn off the pump.

The pump within the housing 24 forces the water upwardly through a lift pipe 33, which is connected through a pipe section 34 which delivers the pump water into the elevated disposal pipe 35. If desired, the pipe 33 may have a T 36 and a vent pipe 37, which serves to prevent any possibility of siphoning of water back into the pump well 19, if a pump should become ineffective by reason of a power failure or otherwise.

In constructing a foundation wall or footing in accordance with my invention, the conventional procedure is followed up to the completion of the basement excavation, and then the form for the pouring of the concrete footing is installed. Usually a shallow trench as wide as the proposed footing is made in the floor of the hole. At the inner edge of this trench a stringer is installed to provide a form for the inside face of the concrete footing 10, the upper edge of said stringer being located at the proper height to define the height of the top face of the footing. Where ground water drainage is to be provided, my procedure in constructing the outer form is quite different from the old practice. I have devised a hollow, outside stringer in the form of a drainage conduit which is permanently installed in the excavation, so that it is not necessary to go to the expense of supplying and removing the conventional stringer and then laying a drainage line of conventional open-joint tiles.

This combination, dual-purpose, hollow stringer and foundation drain duct 18 may be made of any durable, rugged material capable of resisting the action of soil, water or air, for example, fiber glass, plastic substances, asbestos pipe of the type sold by the Johns Manville Company under the trade name "Transite," asphalt impregnated or chemically impregnated hardboard, wood, fiber sheet or board, light weight, cementitious or concrete material, or metal. However of whatever material the same may be constructed, no conventional wooden stringers are employed, and no conventional drain tiles are needed.

In constructing a foundation in accordance with my improved procedure, the unwanted ground water may be admitted through suitable openings or perforations 38 in those parts of the duct 18 which are not in contact with the concrete face of the footing 10. These perforations 38 may be made in the outer vertical wall 39 or in some cases, in the bottom wall 22 of the conduit. I prefer to use fairly long lengths of conduit with holes perforated along the length thereof.

Before pouring the concrete for the footing 10, the position of the duct 18 is established by means of suitable supports such as stakes, etc., and the footing 10 is then poured. After the setting of the footing, conventional forms are installed on the footing for the pouring of the foundation wall 11, and after the foundation wall 11 is poured, the inside stringer or other type of form element used for the inside face of the footing 10 is removed. Then, after the wall 11 has set, its form is removed. Nothing is done to disturb the conduit 18 which, having served its purpose as a stringer, still remains to serve the additional purpose of a drain for the foundation.

In order to enable the ground water to get into the conduit 18, it is advisable to fill the spacing outside of and above the conduit 18 with gravel, rock fragments or other suitable filler bed material 40. After a suitable quantity of filler material 40 has been placed in the trench over and around the duct 18, a sufficient amount of earth or other available material is placed in the trench to form the back fill 41. In some instances, before back filling with earth and at some stage during the procedure when mixed concrete is available, a thin (but discontinuous) layer of concrete may be spread over the top of the filter bed in order to spread the load of the back fill.

As show in FIGURE 2, the duct 18 is integral without the use of joints extending longitudinally along the conduit. In FIGURE 5, I have illustrated the conduit which may be made out of an outer wall 42 and an inner wall 43, the margins of which are nailed or otherwise secured to wooden separator strips 44 and 45.

In FIGURE 6, there is illustrated a different type of conduit which is collapsed for shipment, as shown in FIGURE 7. This style of conduit may be factory-made from a rather wide strip of suitable material, for example, asphalt impregnated fiber board about ⅛ inch in thickness. The strip has suitable longitudinally extending scorings so that it can be shipped flat, or substantially flat, as shown in FIGURE 7, and then set up or expanded to the rectangular form shown in FIGURE 6 when it arrives on the job. This type of conduit may be made with an upwardly projecting flange as shown at 47 in FIGURE 7, formed by cementing together or otherwise uniting the lips or margins 48 and 49 of the strip from which the conduit is made. In this construction, the uniting together of the margins 48 and 49 not only serves as a lap-seam for the formed conduit, but it also serves as a reinforcing attachment flange through which nails such as indicated at 50 in FIGURE 6 may be driven into the stakes 51 used in supporting and positioning the conduit when it is serving as a stringer.

In FIGURES 8 and 9, I have illustrated two other forms of dual-purpose conduits. In FIGURE 8, the conduit 52 has a straight, vertical, flat inner member 56 of suitable material such as asphalt impregnated fiber board, and an outer member 53 which is a trough shaped strip of similar material having upper and lower flanges 54 and 55 cemented or otherwise united to the upper and lower margins of the inner member 56. In this instance, the apertures 38 for receiving water from the filler bed are in the outside member 53 and the inner member 56 is not perforated.

In the case of the conduit shown in FIGURE 9, the trough shaped member is located on the inside of the conduit and extends into the footing, while the outer member of the conduit is disposed in a vertical plane and is perforated to receive the ground water. In other respects, the arrangements shown in FIGURES 8 and 9 are similar.

This application is a continuation-in-part of my application, Serial No. 642,579, entitled "Combination Hollow Footing Stringer and Foundation Drain Duct," and filed in the United States Patent Office on February 26, 1957, and is now abandoned.

Various of the features of the invention believed to be new are set forth in the appended claim.

I claim:

In a building structure which includes an exterior wall separating a space inside the building from an exterior space where the ground level is higher than it is in said inside space, the combination of a foundation for said wall

which comprises a monolithic concrete footing having an exterior side face, and a top face for supporting said wall, and a unitary ground water draining conduit extending alongside and in contact with said exterior face of the footing below ground level, the top of said conduit being substantially at the same level as the top face of the footing, said conduit having (*a*) an imperforate inner face which during the pouring of said footing has served as a stringer for defining the said exterior face of the footing and (*b*) an outer face which contacts the ground and which is perforated to admit ground water to the conduit for subsequent removal through said conduit.

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