United States Patent

Watts

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[54] **MOISTUREPROOFING PROCESS**

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[52] **U.S. Cl.** **52/744,** 52/303, 52/309

[51] **Int. Cl.** **E02d 31/02,** E04g 23/02

[58] **Field of Search** 52/744, 169, 302, 303, 287, 52/437, 101, 743, 304, 169

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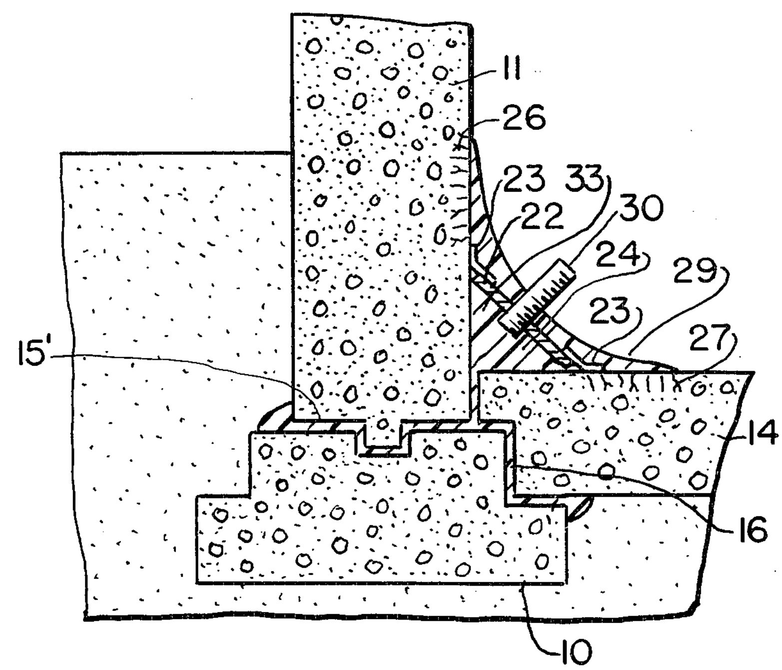
[57] **ABSTRACT**

Cracks or joints in below ground level concrete construction are sealed by the process of bonding a strip of material over the crack to form a channel extending along the crack, pumping air into the channel under the strip to indicate the rate of leakage through the crack, and pumping a more or less viscous sealer into the channel according to the indicated rate of leakage through the crack, the sealer flowing into the crack to seal and waterproof the concrete construction.

2 Claims, 8 Drawing Figures



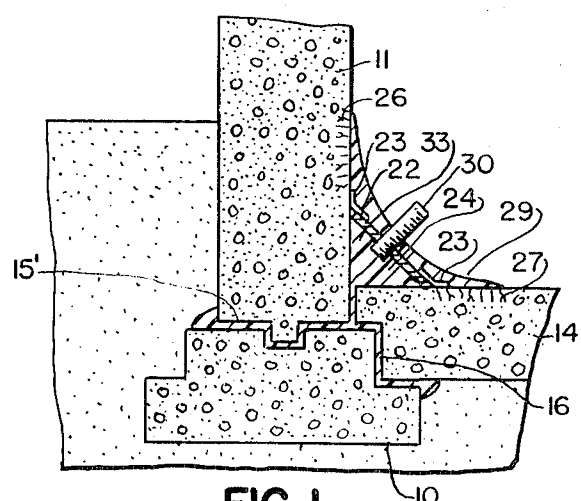


FIG. 1

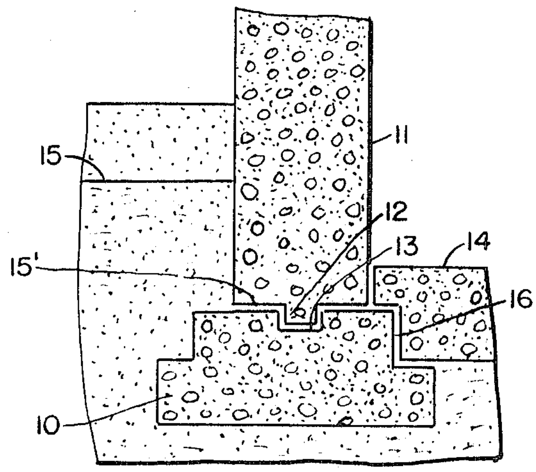


FIG. 2

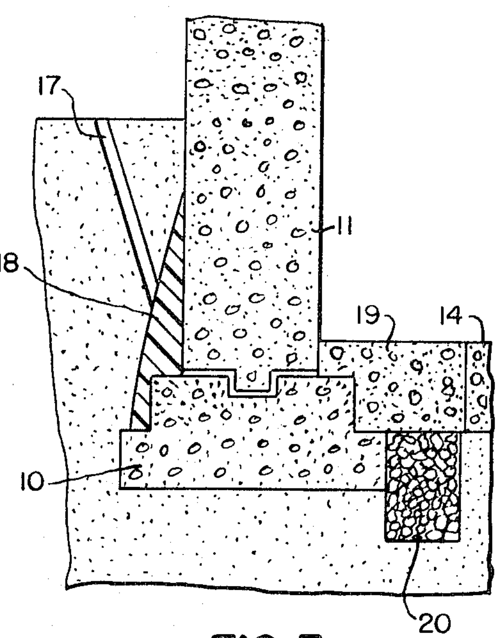


FIG. 3

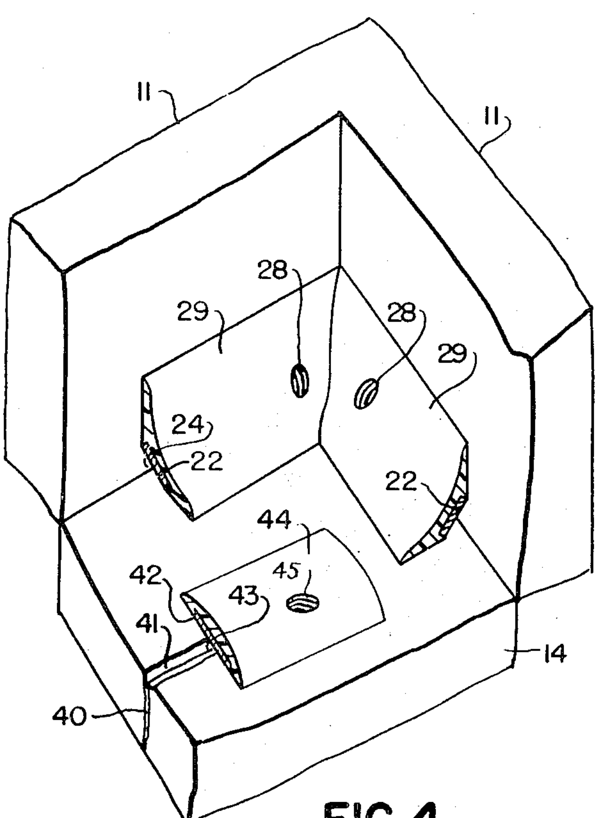


FIG. 4

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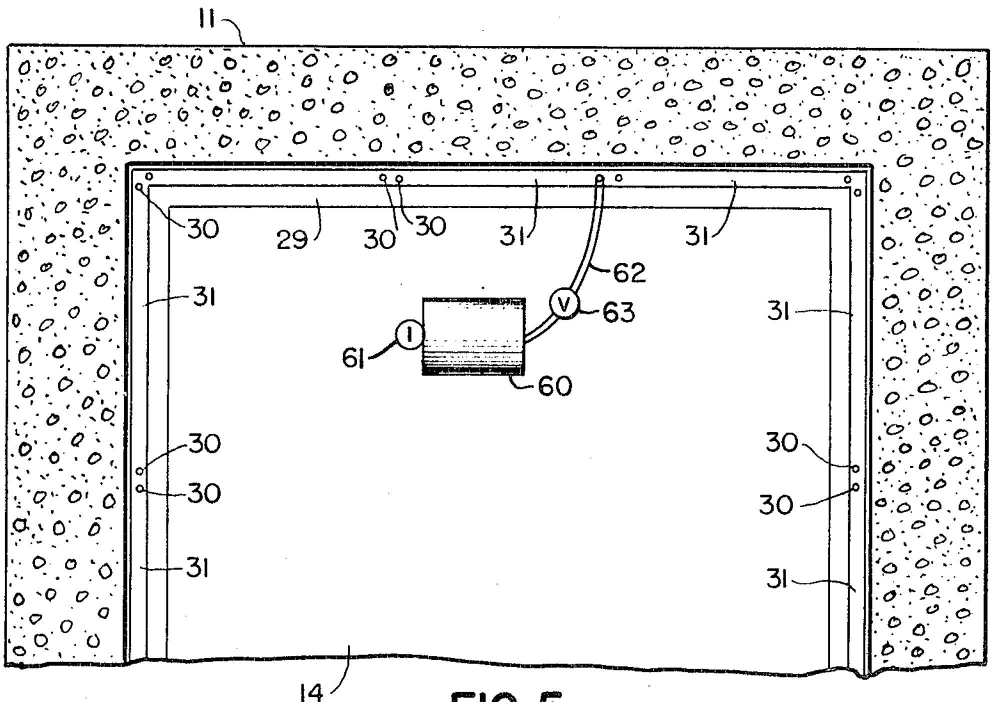

FIG. 5

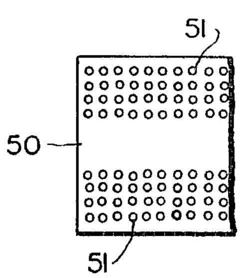

FIG. 7

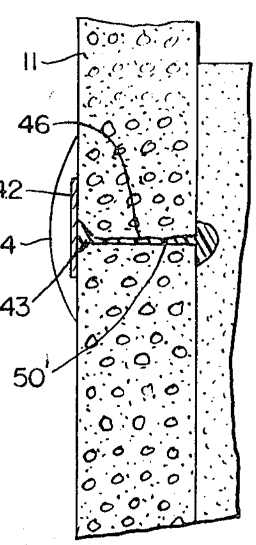

FIG. 6

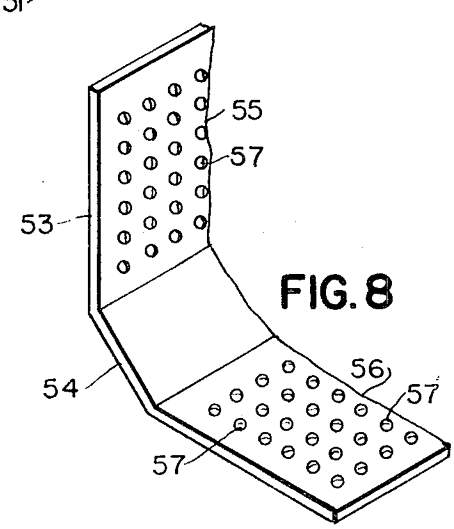

FIG. 8

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MOISTUREPROOFING PROCESS

BACKGROUND OF THE INVENTION

During the construction of below ground level concrete and other masonry structures such as basements and the like, leaks permeable to hydrostatic pressure may develop for many reasons. The settling of new construction may open cracks, particularly at places of stress concentration such as the intersection of floor slabs and upstanding footings and walls. In some instances, the interruption of a pour or the interval between pours will result in poor bonding to produce a leak. Such leaks become troublesome after heavy rains or tides which raise the water table above the foundations to subject them to hydrostatic pressure. While interior sump pumps may remove such leakage, damp with resulting rot, mildew, odors, and the like render leaking basements unfit for residential or commercial purposes.

The conventional method of waterproofing existing foundations against hydrostatic pressure involves boring holes or excavating to pump clay, plastics, foam, or the like to block leakage paths through the wall and between the wall and the footing. Leaks from below passing between the edge of the floor and the wall or footing require breaking up the concrete floor slab adjacent to the wall or footing to dig a drainage ditch for coarse fill. A new border of the floor slab must then be poured and a sump pump or other drainage provided for the ditch. This conventional method is very costly and is not always effective.

SUMMARY OF THE INVENTION

Cracks in flat surfaces are cut out and a flat strip is bonded over them and cracks in corners have a flat strip bonded at an angle in the corner so that the strips in each case form longitudinal channels extending along the cracks. Fittings are inserted in the strips and air is pumped into the channels to determine the amount of leakage through each section of crack. A sealer is prepared with a higher viscosity and other desired properties for cracks determined to have higher leakage therethrough. Low-viscosity sealer is prepared for cracks which have a slight leakage therethrough. The prepared sealers are then pumped under pressure through the fittings into the channels to fill and seal the cracks.

The process of this invention is far more economical and effective than conventional sealing techniques. When epoxy and like sealers are used to cure and cast in place within masonry cracks, the process of this invention actually serves to strengthen the masonry so sealed.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a transverse vertical section through a fragment of a below ground masonry construction, such as a cellar, waterproofed according to the process of this invention, the elements being used in the process of this invention being shown greatly enlarged;

FIG. 2 is a transverse vertical section through a fragment of a below ground masonry construction showing the most usual water leakage paths;

FIG. 3 is a transverse vertical section through a fragment of a below ground level masonry construction shown waterproofed according to conventional processes;

FIG. 4 is a perspective view of a fragment of a corner of a masonry construction with channels shown formed over cracks therein according to this invention;

FIG. 5 is a horizontal section through a fragment of a below ground level masonry room waterproofed according to the process of this invention;

FIG. 6 is a transverse vertical section through a masonry wall waterproofed according to this invention;

FIG. 7 is a plan view of an element used in the process of this invention to form channels over flat surfaces; and

FIG. 8 is a perspective view of a fragment of one end of an element used to form channels over cracks in corners according to the process of this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in FIG. **2**, conventional basement construction provides a footing **10** which supports a foundation wall **11** which is usually poured to be keyed in place by a tongue **12** and groove **13**. A floor slab **14** is poured abutting the footing **10** and wall **11**. If the ground water level **15** rises above the floor slab **14**, the most common leakage paths will be at **15′** between the wall **11** and the footing **10** and at **16** at the edge of the floor slab **14**.

As shown in FIG. **3**, the conventional waterproofing of such basement construction is a costly and difficult process. Through exterior drillings **17** or ditching (not shown), waterproof material **18** is applied to seal the outside of footing **10** and wall **11**. To seal the edge of floor slab **14**, its outer edge must be taken up and a new edge **19** poured in place. This is usually so unsatisfactory, since further settling and working will cause new cracks, that a rubble filled drainage ditch **20** must often be provided with a drainage means such as a sump pump.

As shown in FIG. **1**, the waterproofing process of this invention is more effective and much less costly. To seal a corner between a floor slab **14** and a wall **11**, the masonry surfaces are first cleaned in the area. Grinding may be required when the surfaces are degraded or coated with paint or other material. The area may be further cleaned by being soaked with muriatic acid or the like to attack fine particles. After cleaning, a strip **22** about one to 2 inches wide is laid at an angle and taped in place with fiberglas tape or the like. The strip **22**, temporarily held in place by the tape **23**, defines a channel **24** with the corner. A high penetrating epoxy mixture is applied to the area above and below strip **22** to penetrate and bond as shown at **26** and **27**.

A suitable mixture of this purpose would be an epoxy cement in which two chemical compositions are mixed just prior to application, one composition reacting with the other to form a cured plastic after a predetermined time.

The addition of suitable known compositions will cause the epoxy system to become thixotropic. Continuous brushing or rolling will then lower viscosity and improve penetration into the cleaned concrete or masonry. The proportions of the epoxy system or mixture are varied depending upon the condition of the masonry, its porosity, the ambient temperature, moisture conditions, etc. Maximum bonding power should be obtained to provide a strong channel **24** for the purpose which will be described.

After the epoxy penetration and bonding has been assured at **26** and **27**, a more viscous mixture is applied over the entire corner area including strip **22** and tapes **23**. Fiber glass cloth is applied and impregnated with another coat of epoxy to build up a strong layer **29** over channel **24**.

Holes **28**, as shown in FIG. **4**, are then drilled and tapped for insertion of a fitting **30** into channel **24**. As shown in FIG. **5**, a fitting **30** is inserted at each end of each channel section **31**. The channel sections or lengths **31** are determined or defined by blockages of lumps of fiber glass epoxy impregnated cloth which are allowed to cure therein.

One of the two fittings **30** in each channel section **31** is plugged and air is pumped into the other. By measuring the volume of air at a given pressure during a given time interval passing through a leaking crack and escaping from a channel section **31**, the effective cross-sectional area of a leak may be estimated. In addition, the flow of compressed air will blow water from the leakage area to allow the leak to be better sealed.

If a small amount of air escapes indicating a small effective leak area, a viscous sealer fluid is prepared. If a larger amount of air escapes indicating a larger effective leak area, a more viscous sealer fluid is prepared. Larger leaks also require a sealer with a shorter cure time. Temperature and other conditions should be taken into account in preparing a sealer for a given channel section **31**. One method of measuring the amount of air that passes through a given leak to estimate the effective leak area would be to prepare a small compressed air chamber **60** with a pressure indicator **61** thereon. The chamber would then be charged with compressed air at a given pressure. The chamber would be connected to a fitting **30** with hose **62** and valve **63** as shown in FIG. **5** and airflow through the leak would be measured by measuring the time it took for air pressure in the chamber **60** to drop to a given lower pressure on the pressure indicator **61**.

The sealing mixture, which is preferably an epoxy casting mixture, is pumped into one fitting **30** of a given section **31**. The other fitting **30** in that section **31** may be removed or opened to allow air trapped in channel **24** to escape. Pressure may be maintained on the casting or sealing mixture during its cure period to offset shrinkage. As may be seen in FIG. **1**, the sealer flows where needed in areas **15'** and **16** and sets or cures to form or cast in place a solid seal **33** which extends into channel **24**. It has been found that an epoxy bond or cast in a masonry crack is stronger than the original material and thus may actually strengthen a moistureproof structure.

As shown in FIG. **4**, cracks **40** in flat surfaces are cut out at **41**. In the manner which has been described, a strip **42** is bonded with epoxy and fiberglass cloth over cutout crack **41** to form a channel **43**. The strip **42** and the epoxy and fiberglass cloth **44** form a wall of channel **43** which is bonded to floor slab **14**. Air and a suitably prepared sealer are pumped through drilled and tapped apertures **45** at each end of crack **40** to seal it in the manner which has been described.

FIG. **6** shows a crack **46** in a wall **11** cut out to form a channel **43** covered by a strip **42** which is bonded to wall **11** by epoxy and fiber glass cloth **44**. A sealer **50'** has been pumped into channel **43** to cast in place and seal crack **46**.

FIG. **7** shows a sheet metal strip **50** having perforations **51** in its edges. An epoxy fluid may be painted on each side of a cut out crack and a strip **50** pressed down over it. Epoxy will flow up through the perforations **51** to cure and bond the strip **50** in position to form a wall of a channel to be used in the manner described.

FIG. **8** shows a sheet metal corner strip **53** having a solid center portion **54** and two angled side portions **55** and **56** containing perforations **57**. When a corner is prepared and coated with an epoxy cement adjacent to the corner, strip **53** may be pressed in place with side portion **55** against a wall and side portion **56** against a floor. The epoxy will flow through the perforations **57** to cure and bond the strip **53** in place.

The wall forming strips may be of any desired material. Casting or sealing materials may be varied depending upon specific conditions. Polyesters may be substituted for both channel construction and sealing and casting. Butal and silicone rubbers may be used for sealing.

I claim

1. In the process of waterproofing below ground level masonry structures such as basements which contain cracks, the structures being waterproofed from the inside against hydrostatic pressure leaks from the outside, the steps of

a. bonding a strip over a crack forming a longitudinal channel larger than the crack over the length of the crack on the inside of the masonry structure,

b. providing an inlet through the strip leading into the longitudinal channel,

c. pumping air under pressure through the inlet into the channel to blow through the crack,

d. measuring the flow of air pumped through the inlet to determine the effective area of the crack,

e. providing a flowing sealer with a greater viscosity for cracks determined to have a larger effective area,

f. pumping the flowing sealer under sufficient pressure to overcome any exterior hydrostatic pressure through the inlet into the channel to flow into the crack under the channel, and

g. allowing the sealer to harden in the crack and in the channel thereover.

2. The process according to claim **1** wherein said sealer is an epoxy mixture which cures in said channel and in said crack.

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