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2,433,652

FLEXIBLE SEALING JOINT

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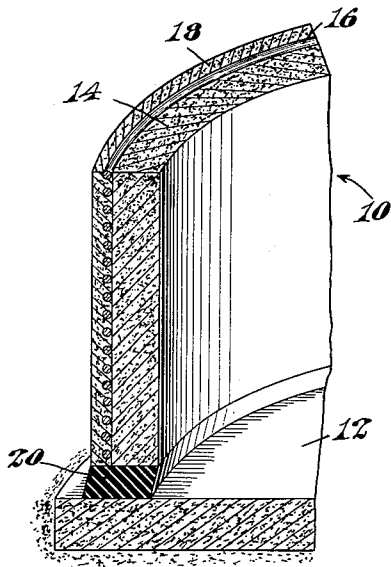


Fig. 1.

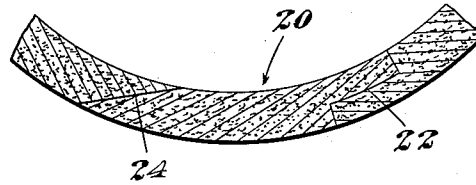


Fig. 2.

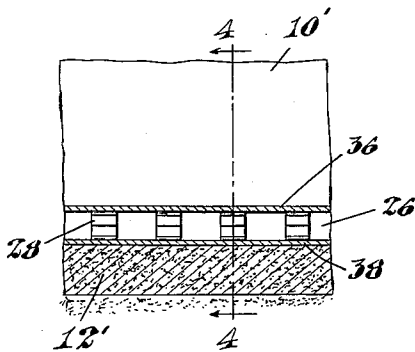


Fig. 3.

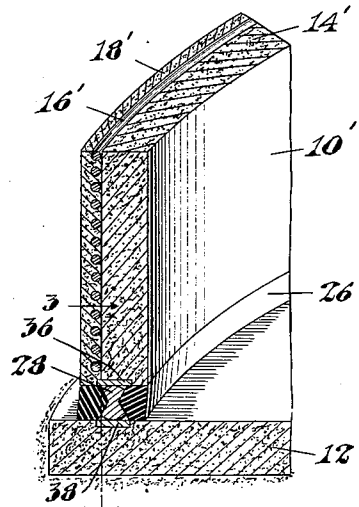


Fig. 4.

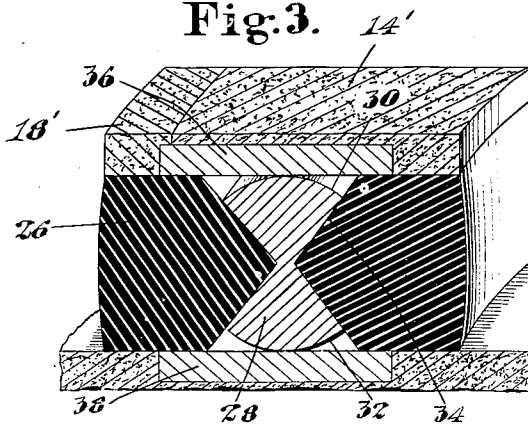


Fig. 5.

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UNITED STATES PATENT OFFICE

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5 Claims. (Cl. 72-13)

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This invention relates to concrete structures embodying a vertical wall supported on a base and relatively displaced therefrom due to setting shrinkage and/or compression from stressed steel reinforcement applied to the wall, and the primary object of the invention resides in the provision of resilient means between the wall and base for supporting the former on the latter, providing a liquid tight seal therebetween at the joint and permitting relative shifting movement of the wall to accommodate the said displacement.

My Patent 2,342,181 discloses a concrete tank and illustrates inward shrinkage of the wall relative to the base as the concrete sets. Also in my Patent 2,315,894 is illustrated a concrete tank in which the wall is placed and held in compression by stressed steel reinforcement extending circumferentially around the wall. Such compression causes a further inward shifting of the wall relative to the base. The wall rests on but is a unit separate from the base and in my Patent 2,342,181 steel reinforcement is provided for permitting the shrinkage displacement and maintaining the wall in tight contact with the base. The invention disclosed in this application provides a supporting layer of flexible material between the wall and base for accommodating the wall displacement and maintaining a tight liquid seal at the joint.

The flexible material employed at the wall-base joint will be of substantial vertical thickness, have sufficient resiliency to permit the wall displacement and will be of a compressible nature adapting it to form a tight seal with the cooperating base and wall surfaces. Rubber, and particularly certain synthetic rubbers of the types hereinafter described, are preferred for the flexible material employed and, while the same in a relatively firm form can be employed as the sole element for performing the functions stated, I may in some cases desire to combine therewith, and preferably molded thereinto, a plurality of solid supporting members such as steel rockers for taking the weight load and limiting downward movement of the wall relative to the base. The production of an improved and flexible sealing joint of this nature and for the purposes described comprises a further object of this invention.

These and other features of the invention will be best understood and appreciated from the following description of preferred embodiments thereof selected for purposes of illustration and shown in the accompanying drawings in which,

Fig. 1 is a fragmentary view of a concrete tank employing my invention,

Fig. 2 is a fragmentary sectional plan view of a sealing unit that can be employed therein,

Fig. 3 is a fragmentary elevation of a modified

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construction, partly broken away along line 3-3 of Fig. 4,

Fig. 4 is a sectional view taken on line 4-4 of Fig. 3, and

Fig. 5 is an enlarged view of a portion of Fig. 4.

My invention is particularly applicable to use in concrete tanks embodying a vertical wall supported on a concrete base. A tank of this nature comprises a vertical wall 10 on a concrete base 12 as illustrated in Fig. 1. The wall comprises a main inner body portion 14, stressed steel reinforcement 16 extending circumferentially around and holding such portion in compression, and an outer cover portion 18 bonded to and protecting the reinforcement and inner body. The reinforcement 16 is preferably steel wire of high tensile strength and is wrapped tightly on and around the wall portion 14 after the latter has fully set, in the manner described in my Patent No. 2,370,780.

The wall 14 shrinks inwardly during setting of the same, as illustrated and described in my Patent 2,342,181, and the wrapping of the steel reinforcement 16 thereunto under high tensile stress places the wall in compression and causes it to shift further inwardly relative to the base. Because of this shifting of the wall on the base, the wall and base must not only be constructed as independent units but must furthermore be so constructed that the wall is permitted this displacement without disrupting either unit or causing leakage at their junction. The novel construction of my invention as herein disclosed is particularly adapted to serve these functions with great facility.

As illustrated in Fig. 1, a layer 20 of flexible material of substantial thickness is built into the structure between the wall and base units. The layer is continuous and can be a unit or it can be constructed and placed in sections as illustrated in Fig. 2, the sections being joined together by suitable joints as indicated at 22 and 24. The material will necessarily be relatively firm, flexible and of a resilient and somewhat compressible nature adapted to form a tight liquid seal under pressure engagement with the adjacent faces of the wall and base. The most suitable material serving these functions which I have so far determined comprises rubber and more particularly certain synthetic rubbers. "Neoprene compound M-2617," manufactured by the United States Rubber Company and having a durometer of approximately 70, plus or minus five, appears to be quite satisfactory, and "Thiokol" and other less expensive synthetic rubbers of like durometer are also well adapted to this use. The greatest displacement of the wall takes place during the preliminary setting of the concrete and the compression banding of the wall, though continued displacement does take place for a period of three to six months

after which the wall becomes substantially settled to permanent position. When the wall has become thus settled the joint material continues to serve its sealing function and maintain a tight leakproof joint between the wall and base.

The functions to be served by the layer or block of material 20 are (1) the forming of a tight sealing joint between the wall and base and (2) the permitting of shrinkage movement of the wall relative to the base while maintaining the sealing joint intact. These functions are performed with maximum facility in accordance with my invention in which the block 20 is of a width or thickness substantially coextensive with the thickness of the wall horizontally, whereby not only providing a solid block of substantial mass for supporting the heavy weight of the wall but also providing sealing contacts over wide areas of the wall and base. The substantial area of sealing contacts thus provided throughout the thickness of the wall serves to maintain a tight seal at the joint even though portions of the sealing contacts with the wall and base should become loosened or defective, and the large mass of material serves to support the wall without undue crushing effect on the material.

It may in some cases be desirable to limit the settling or approaching movement of the wall relative to the base and in Figs. 3-5 I have illustrated a modified structure for serving this function. In this case the joint material 26 may have molded therinto a plurality of solid members in the form of steel rockers 28. These rockers can be of the shape illustrated in Fig. 5, each having arcuately shaped top and bottom supporting surfaces 30 and 32 and intermediate V-shaped recesses 34 for receiving the joint material molded into supporting contact therewith. The rockers are placed in spaced relation with their arcuate surfaces directed radially, and preferably steel plates 36 and 38 are provided adjacent to the wall and base for contact with the rockers whereby to sustain the load without danger of crushing the concrete. The plates will also preferably be of a width less than the thickness of the wall whereby the joint material 26 will make direct sealing contact with the wall and base at both sides of the plates. The vertical thickness of the joint material will ordinarily approximate one to two inches and the rockers will be of a diameter approximately $\frac{1}{8}$ " less whereby permitting the material to compress $\frac{1}{8}$ " before the load is taken by the rockers, although these dimensions can be varied as experience and conditions require. The dimensions will however in any case be such that the wall and base are brought into firm sealing contact with the sealing material and it will continue to maintain such contact. It will be apparent that the limiting of the crushing load effect on the sealing material eliminates the danger of unduly compressing the material to a degree where it might lose a substantial portion of its resiliency and sealing effectiveness.

It will now be apparent that I have produced a new and improved flexible sealing joint for concrete construction and a method of constructing concrete tanks and the like with provision for the wall displacement which results from shrinkage and compression while at the same time providing and maintaining a tight liquid seal at the junction of the wall and base.

Having thus described my invention what I

claim as new and desire to secure by Letters Patent of the United States is:

1. A tank comprising a concrete base, a horizontally endless vertical wall supported on and extending upwardly from the base, and a continuous layer of flexible and liquid impervious material of substantial thickness vertically between the wall and base and supporting the wall in spaced relation on and above the base, said material being of a thickness horizontally substantially commensurate with the thickness of the wall and being in sealing contact with the wall and base over areas substantially commensurate with the area of the bottom face of the wall and providing a leakproof joint between the wall and base and its flexibility permitting a substantial lateral movement of the wall relative to the base without relative sliding movement between the material and the wall or base.

2. The combination defined in claim 1 in which said material comprises a synthetic rubber of a durometer approximating 70 plus or minus five.

3. In combination, a concrete base, a concrete wall supported on and extending upwardly therefrom, a continuous layer of flexible material of substantial thickness vertically between the wall and base, and a plurality of solid elements in and spaced along said layer and cooperating with said material to support the wall on the base, said material being in tight face to face pressure sealing contact with the wall and base continuously along the entire length of the wall and its flexibility permitting a substantial lateral movement of the wall relative to the base without sliding movement of the material relative to the wall or base, and said solid elements positively limiting movement of the wall toward the base.

4. The combination defined in claim 3 plus plates of steel or the like disposed between said elements and the wall and base for distributing the weight load over the wall and base areas.

5. A tank comprising a concrete base, a horizontally endless vertical wall supported on and extending upwardly from the base, a continuous layer of flexible material of substantial thickness vertically between the wall and base, and a plurality of steel rockers in and spaced along said layer in a position to rock radially of the tank, said rockers cooperating with said material to support the wall and said material being in tight face to face pressure sealing contact with the wall and base continuously along the entire length of the wall and its flexibility permitting a substantial lateral movement of the wall relative to the base without sliding movement of the material relative to the wall or base.

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