Jan. 27, 1970 W. E. DYER 3,491,499

DECK OF CONCRETE SLABS AND METHOD OF MAKING THE SAME

Filed April 8, 1968

FIG. 1

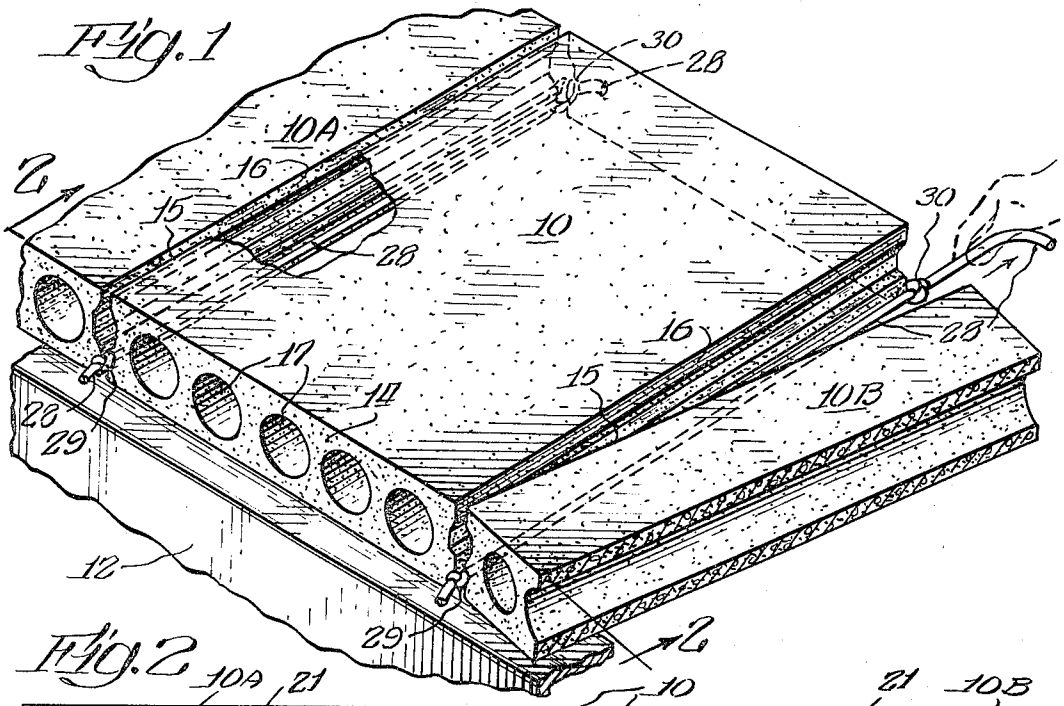
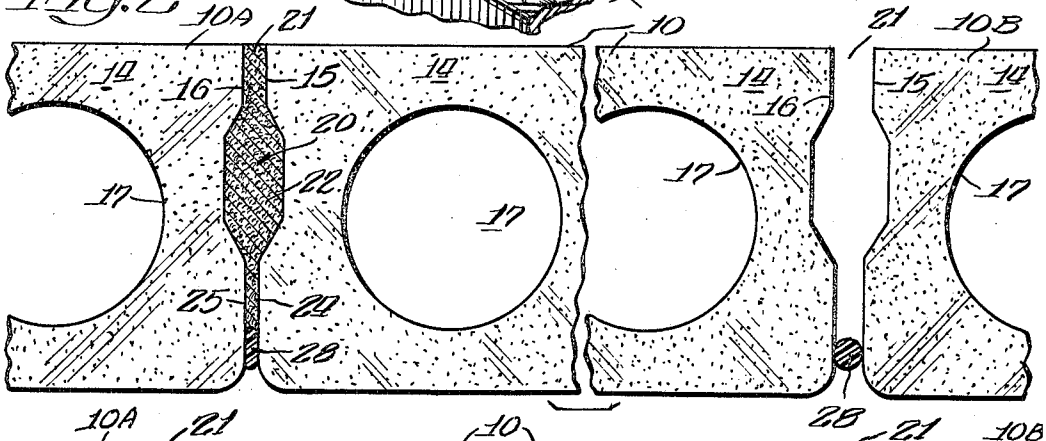


FIG. 2



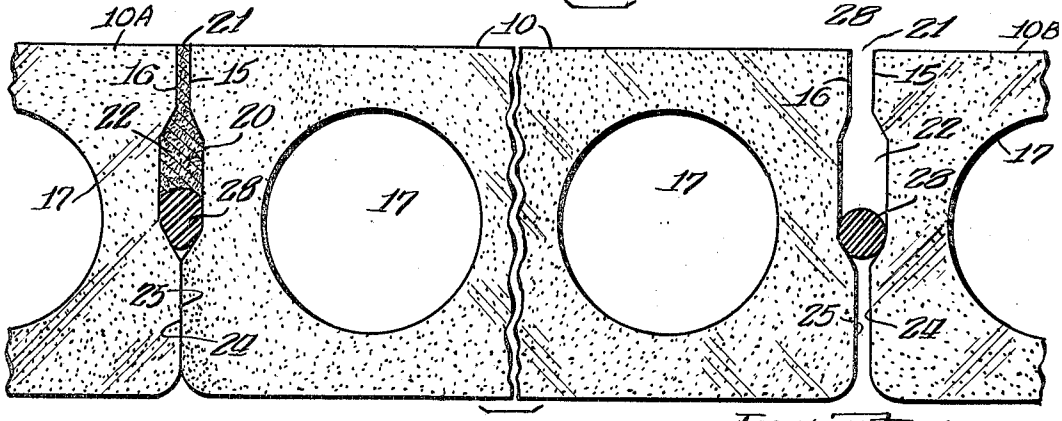


FIG. 3

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U.S. Cl. 52—396 6 Claims

ABSTRACT OF THE DISCLOSURE

A generally horizontal roof deck consists of concrete slabs disposed side by side. An elongated elastic rope of stretchable gasket material is disposed between adjacent slabs at or near the bottom of a grout keyway. The rope is tensioned and anchored at the slab ends so that it maintains itself in position between slabs. Grout may be applied in the keyway, the rope preventing grout from dripping through. The rope may also function as a spacer between adjacent slabs to maintain overall dimensions.

This invention relates to a deck of concrete slabs and to a method of making the same. In particular, the invention permits the finishing of such a deck after such slabs have been disposed in side by side relation.

The use of elongated concrete slabs for making decks in various buildings is well-known. Such slabs may range in length from a minimum of about 16 feet and are generally supported at their ends and/or at intermediate points. Slabs are disposed in side by side relation and are generally grouted together to form a laterally continuous construction. Generally the opposing sides of adjacent slabs are provided with keys or grout channels so that grout, after curing, may lock adjacent slabs for making a mechanically strong and tight joint.

It has been customary to provide a mass of grout above the top surface of a deck (this deck may be a ceiling of one story or a multi-story construction) and sweep the grout into each grout key between adjacent slabs. Even though the slabs are snug against each other, the watery grout leaks through the key to the bottom face of the assembled deck and hardens into beads. The grout beads must be avoided since concrete slabs are cast in such a manner that the bottom face of the slab, which would be visible as the ceiling of a room or structure, is quite smooth and normally would not require any further finishing after the deck is assembled. Usually the grout is cleaned off before drying to retain the natural finished slab surface. If not cleaned off prior to hardening, any beads or grout masses have to be ground smooth.

Apart from grout sealing, there is usually some problem in controlling accurately the total width (transverse to slab length) of a deck. Slabs positioned snugly together may have a total transverse dimension somewhat different (usually short) from the theoretical integrated slab widths. This is usually due to a slab width being actually a bit less than the theoretical width. Thus as an example, a 24 inch slab in practice may be about ⅛ inch narrower. It is frequently desirable to space at least some adjacent slabs to correspond to the full theoretical slab width. Thus in the example given above, it may be desirable to space some adjacent slabs 24 inches between slab center lines. This may avoid odd widths.

In accordance with the present invention, a simple and effective means for grout retention and/or controlling spacing between adjacent slab sides is provided. Such means, applied prior to providing grout, serves as a grout seal. This eliminates cleaning and preserves the normally smooth clean surface of a slab assembly at the lower or ceiling side thereof.

In general, the invention contemplates providing an elastic stretchable strip or rope of gasket material between adjacent slabs for the length of adjacent slabs. The rope gasket may be along the bottom of a grout key, if simple sealing only is desired or may be below the grout key if slab spacing is to be controlled. The rope (or strip) is sufficiently thick, so that when tensioned, the reduced transverse dimension permits snug placement between slabs, after which rope tension is reduced with the rope becoming thicker and being tight in position. A tensioned rope can be locked at slab ends by a knot at each rope end. After such rope is positioned, grout may be worked into the grout keys in conventional fashion. The tensioned rope functions as an effective seal to prevent grout from dripping through to the ceiling side of the assembled slabs and permits the grout to harden with the bottom faces of adjacent slabs remaining clean and unaffected by the grout. Where the rope is below the bottom of the grout key, it can also function as an accurate spacer between adjacent slabs.

The rope itself may be of any suitable material such as rubber (sponge or solid) or plastic. Thus, as an example, sponge or polyethylene rope having a normal untensioned diameter of the order of about ⅜ inch or ½ inch may be used with most conventional slabs. The rope may be of material which can absorb some water, although within wide limits, the rate of water absorption is not important. The rope is tensioned sufficiently to reduce the untensioned rope's normal diameter to a desired value. In practice, a length of tensioned rope is disposed between adjacent slabs at or just below the grout key and may function as a gasket not only for the grout key but also as a spacing member between adjacent slabs.

Instead of a round rope, or filamentary shape, a flat ribbon may be used. The rope is preferred, however, since there is no twisting problem. During the application of the rope, the initial rope tension may be sufficiently great so that the reduced rope diameter permits it to be positioned at the lowest point of the grout key. Thereafter the tension can be relaxed to permit the rope to thicken sufficiently to provide an effective gasket seal. Knots or other means at the rope ends for clamping the rope at the ends of the slabs will serve to anchor the tensioned rope.

Where a desired spacing between adjacent slabs is desired, the rope can be tensioned to the diameter corresponding to the slab spacing and positioned in or below the grout key. The latter will usually be preferred. The slab to be added may be moved against the rope and slab weight is sufficient to maintain the adjacent slabs in predetermined spaced relation, with the rope tightly gripped between opposed slab sides. The space between slabs at the ceiling side may have cement, plaster or caulking compound trowelled in for fill. This can be done at any time. The rope may be disposed close to the slab bottoms (near the ceiling slab sides) and be used as a finished joint between slabs. The bottom rounded slab corners permit the ceiling rope to be recessed from the ceiling sides of the slabs to provide a finished appearance. The final finish will be provided by painting.

The invention will now be disclosed in connection with the drawings wherein:

FIG. 1 is a perspective view with certain parts broken away illustrating one form that the invention may assume.

FIG. 2 is a section along line **2**—**2** of FIG. 1.

FIG. 3 is a section somewhat similar to FIG. 2 except that a modified form of the invention is illustrated.

A plurality of slabs **10**, **10**A and **10**B may be assembled to form a generally horizontal deck. The slabs may be sup-

ported at spaced intervals along the length thereof in accordance with usual practice. As an example, one end of each of the slabs can be supported on wall or beam **12** which may be of steel, masonry or concrete. The other end of each slab may be similarly supported or, if the slabs are long enough, supports beneath intermediate slab portions may be provided.

Each slab is of concrete, may be reinforced with steel or not as desired and may assume a variety of shapes. As illustrated here, slab **10** has end face **14** and sides **15** and **16**. The length of the slab is parallel to the length of sides **15** and **16**. Slab **10** may have any desired width and may be provided with longitudinal channels or passages **17** as disclosed in U.S. Patent No. 2,299,111. Inasmuch as the invention is not concerned with the details of the slab structure except for the sides **15** and **16**, no further description of the structure of slab **10** or slabs **10A** and **10B** is necessary. Slabs **10** may be made in indefinite length and may be cut to size or may be made in casting forms to predetermined lengths.

Adjacent slabs are locked together by having grout poured into grout keys along the sides of such slabs. The size, shape and disposition of such grout keys may vary widely. Examples of grout keys are illustrated in U.S. Patents Nos. 2,299,111; 3,023,477; 3,061,904. The grout keys illustrated here are exemplary.

Referring to FIG. 2, adjacent sides **15** and **16** of slabs are shaped to provide grout key **20**. Grout key **20** in section has a bottle shape so that top **21** of the grout key is narrower than middle portion **22** of the grout key. Bottom portions **24** and **25** of the slab sides are generally flat so that they may be in abutting relation as illustrated in FIG. 3.

The slab sides are so shaped that top portion **21** of a grout key will be wide enough so that grout may be worked or swept into the grout key. After curing, the grout provides a firm lock between adjacent slabs. It is understood that the grout keys extend for the full slab length.

In accordance with the invention, rope **28** having knots **29** and **30** is provided between adjacent slabs. Rope **28** is sufficiently elastic so that it may be stretched. For many slabs, rope **28** may have a normal unstretched diameter of about ⅜ inch or ½ inch, which diameter may be reduced substantially by stretching. As illustrated in FIG. 3, rope **28** may be disposed near the bottom of grout keyway **22**. This may be accomplished in any one of a number of ways. One example is to stretch rope **28** sufficiently so that it may be positioned between adjacent slabs after such adjacent slabs have been laid in side by side relation. The rope should be tensioned sufficiently to permit the same to be slipped down through top **21** of the grout key toward the bottom thereof. After the rope has been positioned substantially at the bottom of the grout key with adjacent slabs in proper position, the tension on the rope may be reduced substantially to permit the rope to thicken and lock itself in position at the bottom of the grout key. Knots **29** and **30** are used for locking the rope against the ends of the slabs, the knots being large enough to hold the rope under some tension after the rope has been properly positioned.

Instead of having rope **28** at the bottom of the grout key, it is possible to dispose the rope, while tensioned, between opposing slab side portions **24** and **25** and below the grout key. To position the rope as illustrated in FIGS. 1 and 2, it is desirable to clamp one end of the rope such as the one containing knot **29** between adjacent ends of the slabs **10** and **10B** before slab **10B** is moved toward slab **10**. With the rope tensioned as illustrated in FIG. 1 and disposed below the grout key, slab **10***b* can be moved into final position so that its side is opposed to side **16** of slab **10** and spaced therefrom a suitable distance. Since rope **28** is compressible as well as stretchable, it is essential that slab **10B** be finally positioned properly with respect to slab **10** to provide substantially the desired spacing. Rope **28** will be compressed between the adjacent slab sides.

It is understood that the tension on rope **28** will be reduced sufficiently so that knot **30** will be at the opposite slab end and the thickness of rope **28** will be at a generally desirable value. The final thickness of rope **28** when used in this fashion is not important so long as the rope is permitted to thicken sufficiently to wedge tightly between slabs. The weight of the slabs is sufficiently great so that some compression of rope **28** between slab side portions **24** and **25** will occur with deformation of the normally circular cross-section of the rope.

It is understood in all cases that grout is applied after a rope is properly positioned between adjacent slabs so that the rope will prevent leakage of grout past the rope. The space between adjacent slabs below the rope may be filled with plaster or any other suitable material so that there will be no grooves or spaces at the ceiling or bottom faces of the slabs.

While the compressibility and elasticity of rope **28** may vary within wide limits, a suitable material for use has been the following: Polyethylene foam rope having a density of the order of about 2 or 2.5 pounds per cubic foot. Water absorption is quite low—up to about .08 pound per square foot of surface area. The rope diameter tolerance may be about 1/32 inch for ⅜ or ½ inch normal rope diameter. The rope is stretchable to about 1.5 or 2 times normal length.

In connection with the invention, it is understood that the gasket member, which is preferably although not necessarily rope-shaped, need not be of sponge material. As long as the gasket member is deformable, it can adapt itself to lie between adjacent slabs either when disposed in the grout key or when disposed between abutting slab sides, usually below the grout key when such grout keys are present. With respect to gasket members which also function as spacers, it is understood that the actual spacing is accomplished by initially positioning adjacent slabs at a predetermined desired distance between opposing slab sides. Due to the great weight of slabs, the gasket material as a rule will be too light to function as a spacer stop between adjacent slabs. It is possible to use sufficiently dense gasket material so that the resistance of the gasket material to deformation or compression will permit positioning a slab up against a gasket spacer and rely upon the gasket material itself to prevent one slab from being too close to an adjacent slab. However, it is preferred to use lighter and readily compressible or deformable gasket material in rope form and control the spacing between adjacent slabs by means other than the compressibility or deformation of such gasket material. It is clear that the gasket material, either when disposed in the grout key or below the grout key between adjacent slab sidewalls, functions primarily as a gasket to contain grout and permit adjacent slabs to be in abutting or predetermined spaced relation as desired.

What is claimed is:

1. A deck having a plurality of elongated concrete slabs disposed in laterally offset aligned relation, each slab having top and bottom faces and sides, said slabs being disposed so that the side of one slab is opposite to the side of an adjacent slab, an elongated deformable flexible gasket member extending between adjacent slabs, said elongated member being wedged between adjacent slabs along the slab sides at regions between the top and bottom slab faces, grout between adjacent slabs disposed above said member, said grout being applied last, said gasket member being elastic and normally rope-shaped, said member being in tensioned condition, means for anchoring the ends of said gasket member against the ends of said adjacent slabs, said slabs having rounded corners, said gasket being disposed adjacent said rounded corners so that it may function as a gasket to prevent grout dripping through to the bottom slab faces prior to the setting

thereof, as a spacing member between adjacent slabs and as a finishing member.

2. The construction according to claim 1 wherein adjacent slabs are provided with keyways extending the full lengths of such slabs, said keyways extending from the top slab faces downwardly for a portion of the slab thickness and wherein said tensioned gasket member is wedged in said keyway, said wedging action being obtained by initially stretching said gasket member to reduce its transverse dimension and permit the member to position itself in a suitable location after which the tension of said gasket member is reduced to permit thickening for firm sealing replacement.

3. The construction according to claim 1 wherein said tensioned member is disposed between adjacent slabs for functioning as a spacing member, the gasket member having been initially tensioned to reduce the members transverse dimension when said adjacent slabs are spaced a predetermined distance.

4. In a method of assembling concrete elongated slabs for providing a concrete deck, the steps which comprise disposing a tensioned elastic deformable rope-like gasket member between adjacent slabs for reducing the thickness of such member at a desired level between adjacent slab sides, reducing the tension to laterally expand such member for providing an effective gasket, anchoring the ends of said properly positioned gasket member to the ends of said adjacent slabs and applying grout between said adjacent slabs and above said gasket member for locking said slabs together, said gasket member preventing leakage of grout to the bottom faces of slabs forming such deck.

5. The method according to claim 4 wherein said adjacent slabs are provided with grout keyways extending part way down from the top faces of such slabs and disposing such gasket member in a grout keyway between adjacent slabs, said tensioning procedure initially permitting the gasket member to enter a desired portion of a keyway due to reduced member thickness and locking such member into position upon reduction of tension.

6. The method according to claim 4 wherein a gasket member is disposed while in tensioned condition between adjacent slab sides for controlling slab spacing, adjacent slabs deforming gasket member to provide a gasket seal while functioning as a slab spacing member.

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JOHN E. MURTAGH, Primary Examiner

U.S. Cl. X.R.

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