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Lodige

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[54] **EXPANSION JOINT CONSTRUCTION FOR CONCRETE SLABS**

[76] Inventor: **Alois Lodige,** Frankfurter Weg. 72, Paderborn, Germany

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[21] Appl. No.: **229,645**

Related U.S. Application Data

[63] Continuation of Ser. No. 25,205, April 2, 1970, abandoned.

[52] **U.S. Cl.** **404/51,** 52/573, 52/396

[51] **Int. Cl.** **E04b 1/68**

[58] **Field of Search** 404/47-68; 52/396, 52/573, 705, 707

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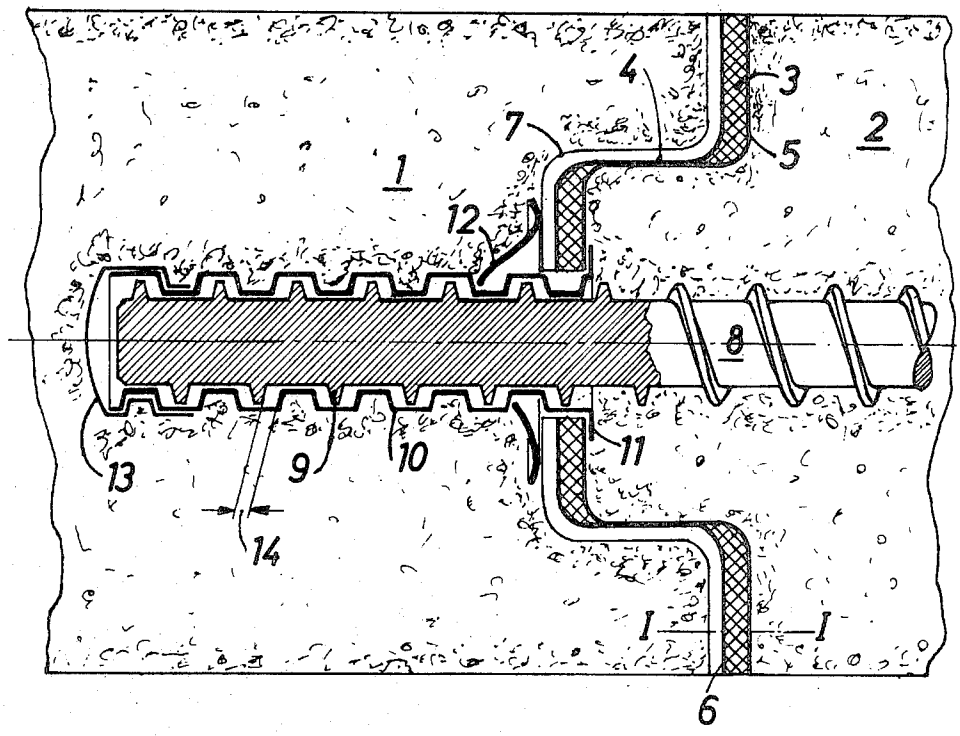
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Primary Examiner—Frank L. Abbott
Assistant Examiner—H. E. Raduazo
Attorney—George B. Newitt

[57] **ABSTRACT**

An expandable tongue and groove joint between abutting edges of reinforced concrete slabs having spaced nesting metal strips of hat-shaped cross section integrally formed with the slabs. The mantle portions of the strips are in sliding contact with each other, while the spaces between the remaining portions of the strips are filled with compressible expansible material. In another form, a threaded dowel anchored in one slab extends through the strips into a tube in the other slab. The dowel may move axially of the tube to accommodate contraction and expansion of the slabs.

6 Claims, 6 Drawing Figures



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SHEET 1 OF 2

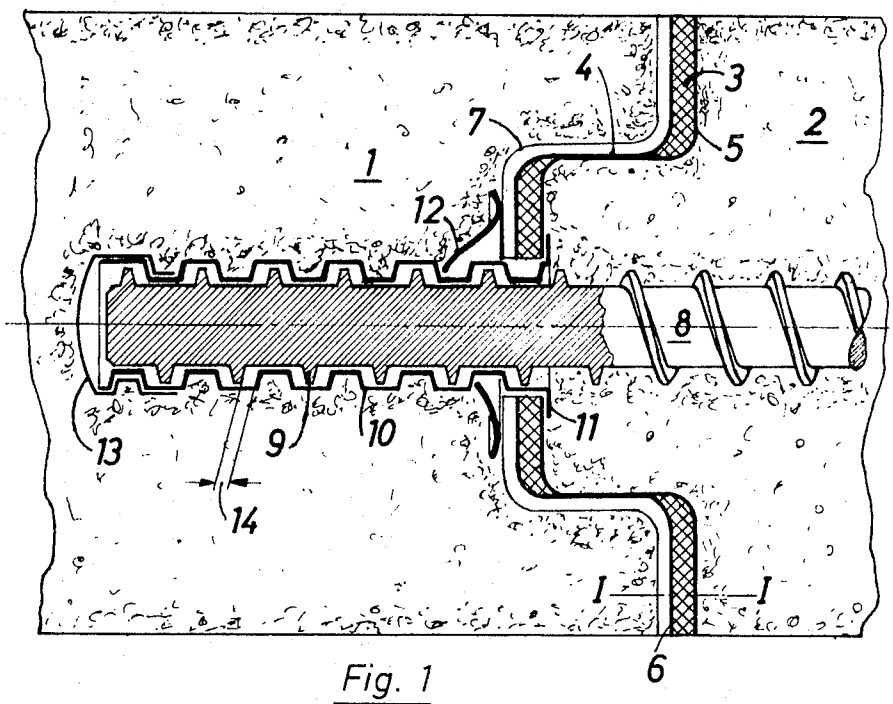


Fig. 1

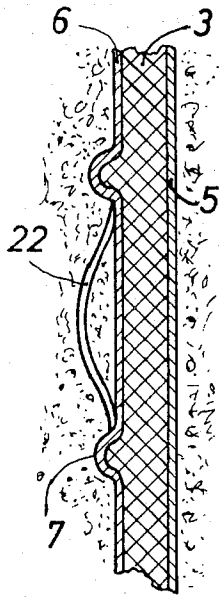


Fig. 2

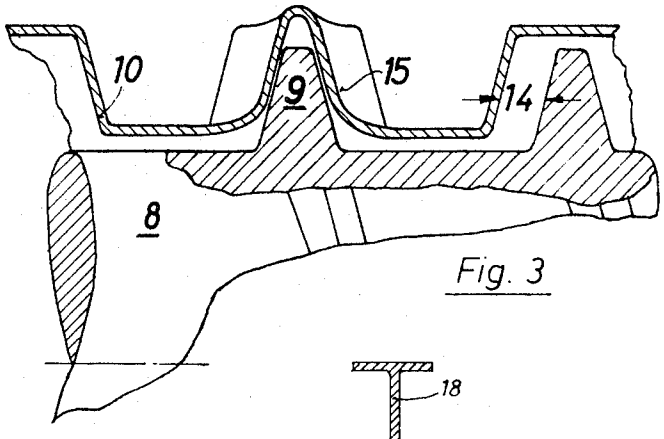


Fig. 3

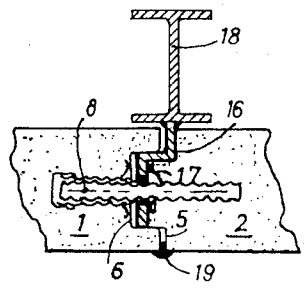


Fig. 4

Alois Lodige
INVENTOR.

BY Malenare, Alligretti
Newitt & Matoff

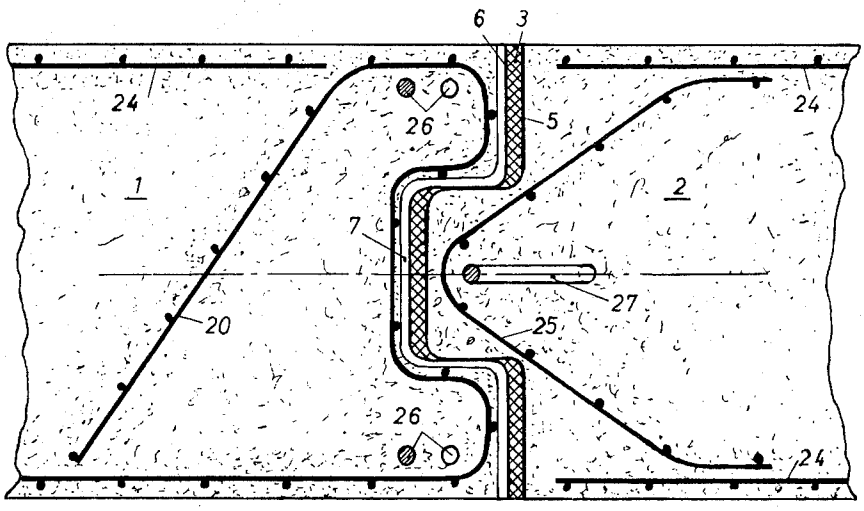


Fig. 5

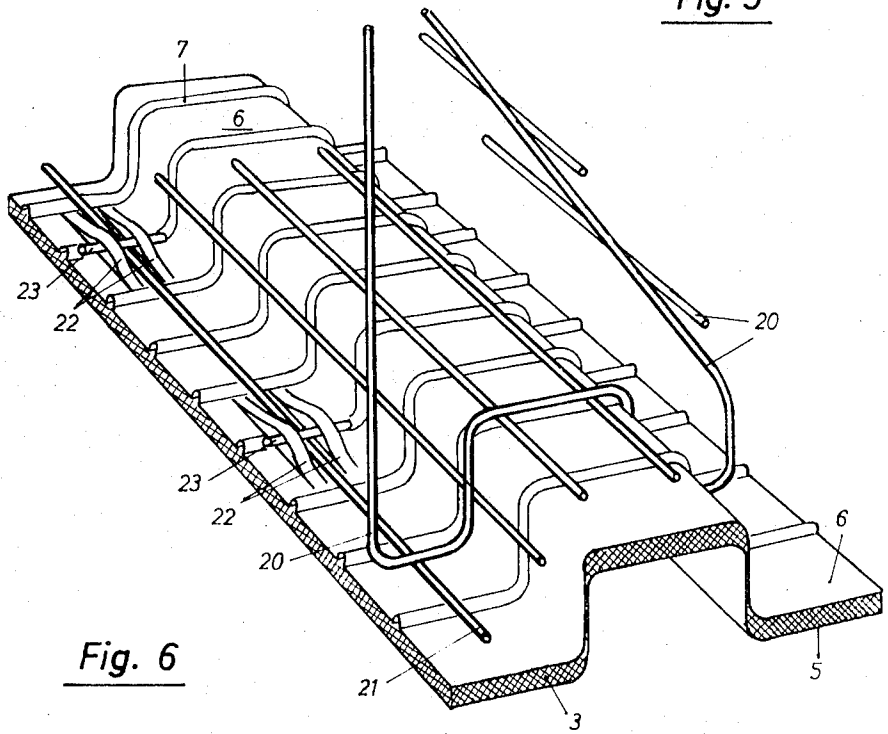


Fig. 6

Alois Lodige
INVENTOR.

BY Molinare, Allegretti
Newitt & Witcoff

EXPANSION JOINT CONSTRUCTION FOR CONCRETE SLABS

This application is a continuation of Ser. No. 25,205 filed Apr. 2, 1970 and now Abandoned.

The invention relates to an expansion joint construction between structural parts of concrete or masonry and with the fastening of these constructional parts among one another by dowels. It finds use for example, in the building of air field landing strips, roads, squares or automobile highways of concrete.

THE PRIOR ART

Expansion joints with or without filling of elastic material, which run rectilinearly in cross section are known. This type of expansion joints has the disadvantage that the slabs shift with respect to one another under forces occurring perpendicularly to the plane of the slabs.

In expansion joints which are Z-shaped in cross section, such a displacement in one direction is likewise possible.

Arrangements are also known which attempt to prevent displacement by means of joint dowels which are firmly embedded in the one slab, and are axially slidable in the other. These dowels are subject to shearing and to bending. The concrete crumbles away at the juncture point, so that the bending length of the dowel becomes greater and greater. In places not solidly surrounded by the concrete, rust forms, which bursts off in the bending of the dowel and again makes the surface accessible to oxygen. The cross section is constantly being weakened, and a break is unavoidable.

In finished concrete slabs an interlocking tongue and groove is also known, in which dowels may be completely omitted or else bolts running longitudinally through the slabs join the slabs securely with one another, so that no expansion joint remains.

THE PRESENT INVENTION

The present invention eliminates all these drawbacks and creates in the most economical and, from the viewpoint of manufacturing technology, simplest manner, a joint between concrete slabs or masonry which permits temperature expansions and simultaneously secures the slabs in such a way that a displacement or a shifting is impossible.

This problem is solved by an expansion joint strip which consists of two profiles, hat-shaped in cross section, inserted one within the other, which are installed as an integral part of the construction at the abutment between two structural parts being joined, and are fastened to the metal reinforcing rods. (Monier work). This simple assembly provides a rigid skeleton of reinforcing rods and an expansion joint strip, which is thereupon poured with concrete.

The expansion joint strip consists of two channel-like sheet-metal or plastic strips of hat-shaped cross section. The two sheet-metal or plastic channels are nested one within the other in such a way that they engage in one another with their hat profile as a tongue-and-groove. The mantle surfaces of the two hat profiles lie without interspace tightly one upon another, while the vertical top and flange surfaces are spaced with respect to one another, the space corresponding to the magnitude of the temperature expansions to be expected. The joints thus resulting are filled with material capable of compression and expansion, which can be cemented to the surfaces of the profiles.

In at least one of the channel-like hat-profile strips there are impressed stiffening corrugations running transversely outward, which impart to the expansion joint strip the necessary rigidity to bending about a longitudinal axis.

At the midpoint of the expansion joint strip there are bores in which threaded tubes of thin sheet metal have been cast. The tubes are closed on one side with a cap nut. The threaded tube serves to receive a threaded dowel, which joins the two slab parts or masonry parts separated from one another by the expansion joint strip, so that pull forces can be transmitted through this dowel. The thread flanks of tube and dowel have play with respect to one another, so that the dowel can shift axially to a certain degree relatively to the tube. This measure corresponds, in turn, to the amount of the temperature change. So that the dowel, during the assembling of the expansion joint strip, will be exactly centered (symetrically positioned) with respect to the length of the threaded tube, I provide several places along the circumference and length of the threaded tube where the thread courses of the tube are locally pressed together to such an extent that the flank play of dowel and tube is virtually zero. In later axial displacements of the dowel in consequence of temperature changes of the walls of the slabs, in these places, through pressure peaks occuring, the thin-walled tube and the concrete are locally destroyed. After that, the axial play is again fully achieved within the intended limits.

DETAILED DESCRIPTION

The invention is now further explained with the aid of the examples of execution. In the drawing,

FIG. 1 represents a cross section of the expansion joint construction according to the invention with doweling;

FIG. 2 shows a longitudinal section of the expansion joint strip along the line I—I of FIG. 1;

FIG. 3 shows a detail of the thread of dowel and tube;

FIG. 4 shows the expansion joint strip and means for fastening same to a steel girder;

FIG. 5 is a sectional view through the expansion joint strip and the cooperating reinforcing rods of two adjacent concrete slabs; and

FIG. 6 is a perspective representation of the expansion joint strip, with a part of the reinforcing iron rods fastened to the expansion joint strip.

In FIG. 1 there is shown a cross section tongue and groove expansion joint strip, which is situated between two similarly-shaped structural parts (concrete slabs) 1 and 2. The joint is filled with compressible and expandable material 3, which is cemented to opposed surfaces of the complementary hat-shaped profile strips 5 and 6, covering the abutting edges of slabs 2 and 1 respectively. The mantle surfaces of the profile strips 5 and 6 lie directly on one another in the plane 4, free of play, so that they can shift against one another in the contact plane. In this manner the slabs 1 and 2 are braced against one another in the planes 4, so that lateral forces occuring can no longer bring about any shifts. On the hat-profile strip 6, for the purpose of reinforcement, there are impressed stiffening corrugations 7, as best shown in FIG. 5. This rigidity of the expansion

joint strip is required so that during its assembling, prior to casting the purchase-giving concrete around the joint, the mantle surfaces are maintained in parallel relation to permit sliding on one another in the planes 4.

Midway between the top and bottom of the expansion joint strip, and spaced longitudinally thereof, are a series of threaded tubes **10**, made of very thin sheet metal, plastic or similar material. Each tube **10** lies on its side with its terminal flange **11** against member **5** of the expansion joint strip and is screwed fast to the opposite member **6** by the sheet-metal nut **12**. The other end of the tube **10** is closed by the cap nut **13**, so that in the pouring no concrete can penetrate.

Into the threaded tube **10** is screwed a threaded bolt **8**, of such dimensions as to shift axially in the tube **10** in both directions by the distance **14**, FIG. **1**. In order to give the bolt a fixed position between the thread flanks of the tube **10** temporarily during the assembling, the tube is locally compressed in the places **15** distributed over length and circumference, of the threads to such an extent that the thread **9** of the bolt **8** can barely be screwed in. In the places **15**, the concrete and the tube thread is locally destroyed on temperature expansions of the walls, since the dowel **8**, after casting, is securely embedded in the concrete of the wall **2** and shifts with the wall during temperature changes, which results in high pressures at **15**. After the destruction of the confined areas the axial play **14** is fully restored.

In the assembling of the expansion joint strip, there can be installed a cropped flat iron bracket **16** (FIG. **4**) which is carried by the threaded bolt **8** and is screwed with a sheet-metal nut **17** against the expansion joint strip. This bracket projects on one or both sides beyond the wall of the structural part and can be welded, for example, to steel girders **18** to suspend the joint.

After readying the wall or the slabs, the filling material **3** can be burned out at the edge of the expansion joint and the resulting groove can be closed with a sealing elastic profile strip **19**, so that the penetration of moisture will be prevented.

FIG. **5** is a cross section of two adjoining slabs or plates **1** and **2** with the intermediately disposed expansion joint strip made according to the invention.

Further, this figures shows the position of the reinforcing rods (Monier fastening irons) **20, 24, 25, 26, 27.**

The expansion joint strip is fastened during assembling to the wire "basket" **20** reinforcement. As may be seen from FIG. **6**, the rod **21** of the wire "basket" **20** is held between two eyes **22** which are punched out of the hat-profile strip **6**, by a cross pin **23.**

Wire mats **24** provide further reinforcement of the wall parts **1** and **2.** The reinforcing rods **25** gives the tongue side of the slabs the necessary strength. Furthermore, in the same side there is additionally embedded a serpentine rod **27.** The rods **26** lying in series with covering rigidify the projecting parts which form the groove in the slab **1.**

What is claimed is:

1. An expansion joint between abutting parts of a reinforced concrete or masonry structure comprising

a pair of nesting strips, one on each of said abutting parts and each being contiguous with its part over the entire width thereof, said strips having a hat-shaped cross section to provide a tongue and groove joint with contacting mantle portions,

compressible expansible solid material disposed between the hat-shaped strips at the top and flange portions thereof,

reinforcing rods in said structure secured to said strips, and

a threaded dowel embedded in one of said abutting parts and extending through said strips into the other of said abutting parts, said other part containing a threaded tube into which said dowel is threaded and axially moveable, said tube having threads with a width greater than the threads of the dowel to define a space between the threads of the dowel and the tube to allow said axial movement between the dowel and tube.

2. The joint of claim **1** in which the threads of said tube are compressed at spaced places to symmetrically position the dowel temporarily while the joint is being assembled.

3. The joint of claim **1** in which said threaded tube has a terminal flange abutting one of said strips and a nut abutting the other strip to secure the tube to said strips.

4. An expansion joint for reinforced concrete slabs abutting each other in a tongue and groove joint comprising

a first metal strip covering the tongue surface of one slab and integral therewith,

a second metal strip covering the groove surface of the other slab, integral therewith, and nesting with said first strip,

said strips being in sliding contact with each other at the sides of the tongue and spaced from each other in other areas,

the space between said strips in said other areas being filled with solid compressible, expansible material,

a threaded dowel extending transversely through said metal strips in said tongue area into the concrete slabs on either side of the tongue, and a threaded tube positioned in one of said slabs, said tube having threads with a width greater than the threads of the dowel to define a space between the threads on the dowel and the tube, said dowel being threaded into said tube and anchored to one of said slabs wherein said dowel is free to move within the tube positioned in the other of said slabs due to the difference in thread width, and

longitudinally-disposed reinforcing rods secured to said strips at spaced points along the length thereof to strengthen the concrete forming the tongue and groove portions of said joint.

5. The joint of claim **4** which includes additional transversely-disposed reinforcing rods shaped approximately to the contour of said tongue and groove portions and secured to said longitudinally-disposed reinforcing rods within said portions.

6. An expansion joint for reinforced concrete slabs abutting each other in a tongue and groove joint comprising

a first metal strip covering the tongue surface of one slab and integral therewith,

a second metal strip covering the groove surface of the other slab, integral therewith, and nesting with said first strip,

said strips being in sliding contact with each other at the sides of the tongue and spaced from each other in other areas,

the space between said strips in said other areas being filled with solid compressible, expansible material,

and a threaded dowel extending transversely through said metal strips in said tongue area into the concrete slabs on either side of said slabs with the dowel threads embedded in the concrete, the other end of said dowel being disposed within a threaded tube secured to said strips and embedded in the concrete, within which tube said other end is axially movable commensurate with expansion and contraction due to temperature changes, said tube having threads with a width greater than the threads of the dowel to define a space between the threads of the dowel and the tube to allow said axial movement between the dowel and tube.

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