United States Patent

[11] 3,631,643

[72] Inventors **Per Olof Jonell Goteborg; Sven Melker Nilsson, Kallered, both of Sweden**

[21] Appl. No. **861,783**
[22] Filed **Sept. 29, 1969**
[45] Patented **Jan. 4, 1972**
[73] Assignee **Ingeniorsfirman Nilcon Aktiebolag Kallered, Sweden**
[32] Priority **Oct. 1, 1968**
[33] **Sweden**
[31] **13227/68**

[54] **METHOD AND DEVICE FOR THE MANUFACTURE OF CONCRETE BUILDING ELEMENTS**
3 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **52/122,** 52/434
[51] **Int. Cl.** **E04b 2/14,** E04b 2/64, E04b 5/04
[50] **Field of Search** 52/122, 126, 396, 403, 167, 393, 323, 434

[56] **References Cited**

UNITED STATES PATENTS

3,107,377	10/1963	Nathan	52/403
3,278,158	10/1966	Saldana	52/126

FOREIGN PATENTS

43,505	4/1934	France	52/122
662,205	3/1929	France	52/126
1,463,160	9/1966	France	52/122
544,382	4/1942	Great Britain	52/122
6,710,164	3/1968	Netherlands	52/126
447,569	3/1968	Switzerland	52/126
1,023,875	2/1958	Germany	52/122

Primary Examiner—Henry C. Sutherland
Attorney—Kane, Dalsimer, Kane & Kurucz

ABSTRACT: The invention relates to building structures in which slabs are laid on beams, and in which it is desired to maintain the slabs coplanar irrespective of difference in level of the beams and slabs. The invention provides rubber wedges, used in pairs so as to be adjustable to different thicknesses, located between the slabs and beams at intervals and held in place by adhesive.

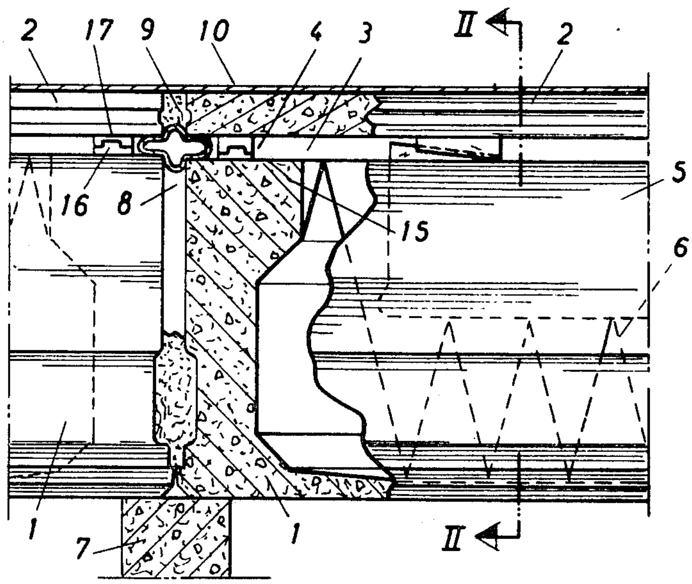
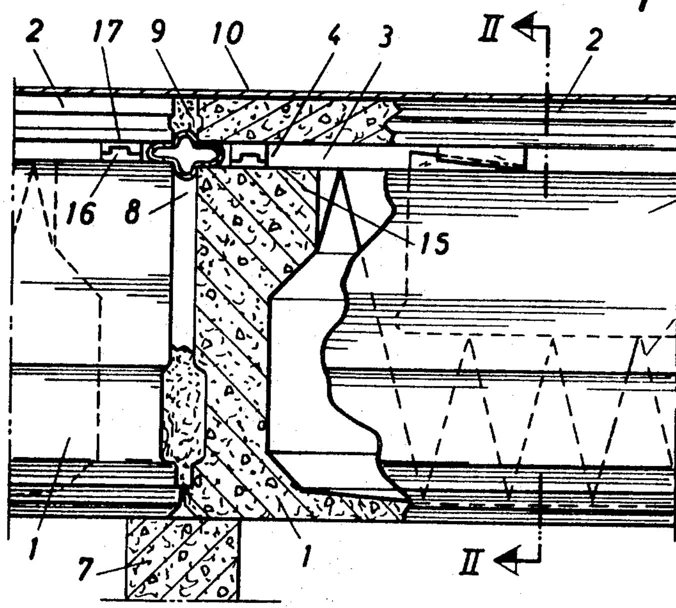


Fig. 1



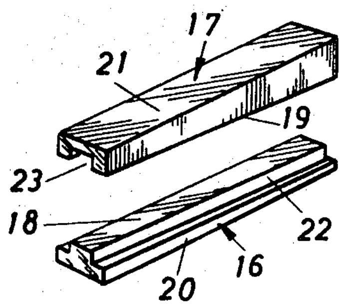


Fig. 4

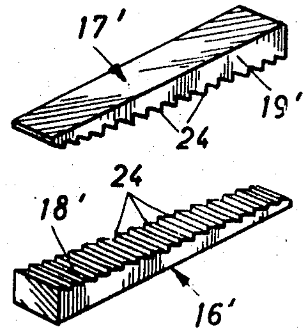


Fig. 5

INVENTORS
PER OLOF JONELL
SVEN MELKER NILSSON
BY

Kane, Dalsimer, Kane, Sullivan & Kurucz
ATTORNEYS

Fig.2

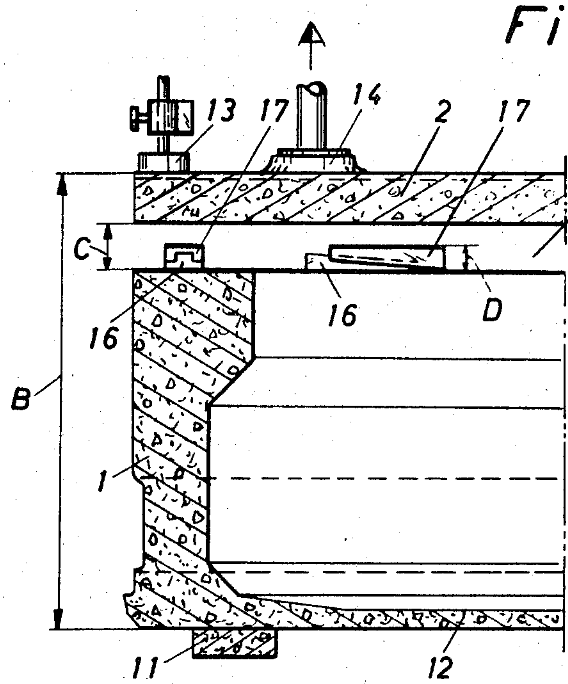
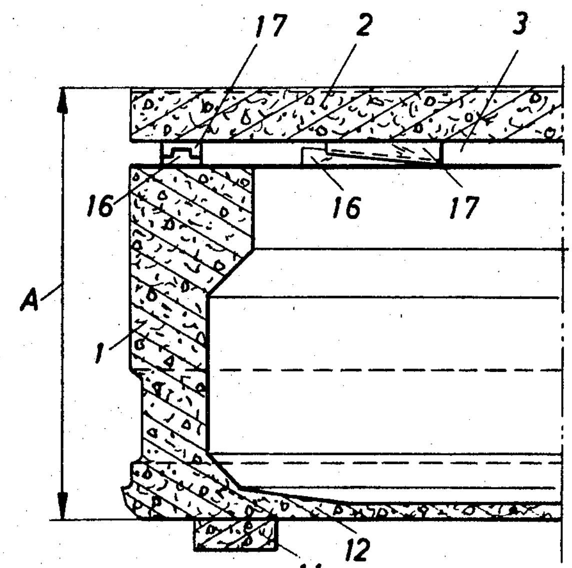


Fig.3



INVENTORS
PER OLOF JONELL
SVEN MELKER NILSSON
BY
Kane, Dalsimer, Kane, Sullivan & Kurucz
ATTORNEYS

METHOD AND DEVICE FOR THE MANUFACTURE OF CONCRETE BUILDING ELEMENTS

BACKGROUNDS OF THE INVENTION

It is known to assemble supporting structures in buildings in the form of adjacent light concrete constructional elements each consisting of a longitudinal concrete coffer and closed by a concrete slag and a sound-insulation member disposed in the gap between said slab and the concrete coffer. In order to produce these composite building elements with a uniform thickness, it has been proposed to lay the concrete coffer on a support, to raise the slab portion to a given height above the concrete coffer, and to inject into the gap between these two parts a foam material which solidifies and at the same time bonds the concrete coffer to the slab. Composite building elements with exactly the same thickness can be produced by this method, even if the individual elements have been given different thickness during casting. However one disadvantage of this method is that because of the relative hardness of the cast material the sound insulation is not as effective as might be desired, and also it is not possible to supply air between the adjacent building elements.

SUMMARY OF THE INVENTION

The object of the present invention is to overcome these disadvantages. According to the invention, in the gap between the slab and the concrete coffer acting as a supporting member there are disposed support wedges made of flexible material and cooperating in pairs, so that the inclined surfaces of the wedges face each other and the total thickness of the wedges can be changed by relative axial movement thereof. According to a preferred embodiment of the invention wedges are of such material and dimensions that under an increase in load on the slab by for instance 50 kg. they are compressed by about 0.2–0.5 mm.

If Neoprene rubber or a similar isotropic synthetic rubber material is used for making the wedges, the danger of cold flow under high loads on the slab, such as often occurs when foamed materials are used for soundproofing, does not arise.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a vertical section through a joint between two adjacent building elements in accordance with the invention,

FIG. 2 is a vertical section on the line II—II of FIG. 1, showing a building element during the assembly of its various parts,

FIG. 3 is a similar section, with the slab lowered into its correct position on the corresponding support wedges,

FIG. 4 shows two cooperating wedges in perspective,

FIG. 5 shows in perspective wedges according to a variation of the invention.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

The concrete building element shown in the drawings consists of a concrete coffer 1 strengthened by reinforcing bars (not shown) and a superimposed flat concrete slab 2, also strengthened by reinforcing bars (not shown). In the gap 3 between these two component elements 1, 2 is inserted sound insulation 4, which will be described in more detail below. The cavity 5 in the coffer 1 contains a layer 6 of mineral wool or like heat- and sound-insulating material. The concrete coffer 1 is supported at its ends by beams 7. These composite concrete building elements 1, 2 are laid close together, and after the gap 8 between adjacent building elements has been filled with fine mortar 9, are covered by a floor covering 10, l.g., a sheet of linoleum.

It is obvious that should the above-mentioned composite building elements 1, 2 have differing thicknesses, there would be a step at the joint between adjacent building elements. The linoleum sheet 10 covering the floor support would be damaged and break after a relatively short time. With the sound insulation 4 as provided by the invention however, each building element has the same thickness and they can be produced in a factory without necessitating any levelling off at the building site, since no differences of level would occur.

In the method of producing a specific thickness in the composite building elements 1, 2 there is provided a support 11 on which the concrete coffer 1 is lowered so that its ends 12 rest on this support. Above the support 11 are disposed vertically adjustable and clampable stop means 13. There are also provided a number of suction discs 14 or other suitable means for raising and lowering the concrete slab 2.

As sound insulation in accordance with the present invention there are used wedges 16, 17 made of Neoprene or similarly flexible isotropic material, superimposed in pairs and placed in the gap at intervals on the top surface 15 of the concrete coffer 1. The wedges 16, 17 are shaped with their side faces of generally parallel trapezoidal shape, with an oblique surface 18, 19; these latter faces are opposite each other when the wedges are assembled, and their inclination is such that the flat side 20 of wedge 16 which is nearest the concrete coffer edge 15 runs parallel to the flat side 21 adjacent the slab 2. The one wedge 16 is provided with a longitudinal rib 22 on its inclined surface 18, and the wedge 17 has a corresponding longitudinal groove 23 along its inclined surface 19, into which the rib 22 of wedge 16 can fit.

According to the embodiment shown in FIG. 5, the inclined surfaces 18′, 19′ of the wedges 16′, 17′ are each provided with transverse ridges 24 which interengage when the wedges are superimposed.

The wedges in the embodiment shown in FIG. 4 can also be provided with corresponded cross ridging. The wedges 16, 17 are held in their set position by the rib and groove joint 22, 23 and the grooves 24.

In assembling the concrete building element 1, 2, the concrete coffer 1 is lowered on to the support 11 (FIG. 2) and a concrete slab 2 is laid loosely on the coffer, whereupon the suction discs 14 are lowered into contact with the upper side of slab 2. A predetermined suction is now applied to the interior of the suction discs, whereafter these are lifted, taking the slab 2 with them, until the latter meets the stop means 13. If the total thickness A of the composite building element 1, 2 should for instance be 300 mm., the stop means 13 should be set to a height B above the support 11 which exceeds by a certain amount, e.g., 30 mm., the total thickness A of the finished building element. Height B consequently is 330 mm. The height C of the gap between the concrete coffer 1 and the slab 2 is now measured. If the height C is for instance found to be 42 mm., the thickness D of the superimposed wedges 16, 17 is set to 42–30=12 mm. This thickness D is adjusted by mutual axial displacement of the wedges 16. 17/ If the pairs of wedges 16, 17 are now disposed at intervals on the edge 15 of the concrete coffer, and the slab 2 lowered on to these wedges (FIG. 3), the correct thickness A of the composite building element will be produced.

Another method of assembling building elements is to raise the slab 2 to the correct height in the manner given above, to feed the wedges 16, 17, provided with an adhesive, into the gap 3 and then to displace the wedges in each pair by a tool, in a direction relative to each other so that they are pressed together, with the lower wedge 16 pressed against the top of the coffer-shaped part 1 and the upper wedge 17 against the underside of slab 2.

The number of pairs of wedges, their mutual spacing, the choice of material and the dimensions of the wedges should be such that under an increase in load on the slab by, e.g., 50 kg./m.², all the pairs of wedges undergo a compression of about 0.2–0.5 mm.

As seen for example from FIGS. 1 and 2, it is possible to direct an airstream, l.g., a hot airstream, through the gap between the concrete coffer 1 and the slab 2 of all the building elements assembled into a support layer.

The mutual axial displacement of wedges 16, 17 can advantageously be effected by a tonglike tool so shaped that when both limbs are inserted into the gap 3 between the concrete coffer **1** and the slab **2**, with one limb lying against the upper edge **15** of the coffer and the other against the slab **2**, the two opposite limbs of this tool move the wedges **16, 17** axially towards or away from each other to the correct predetermined total thickness D, whereupon the wedges with this total thickness are inserted into the gap 3 and laid out at equal spacings on the upper surface **15** of the concrete coffer.

The embodiment shown and described is only to be considered as an example, and the various parts of the building element can be changed in a number of ways within the scope of the following claims. For instance the supporting coffer-shaped portion **1** may be given a different shape or material.

Before their insertion into the gap 3, the wedges **16, 17** should be provided with a quick-setting adhesive both on their inclined surfaces **18, 19** and the parallel surfaces **20, 21**, so that the pairs of wedges are firmly bonded both to the slab **2** and the concrete coffer **1** when the slab is lowered.

What we claim is:

1. Concrete building elements adapted for assembly, each element comprising:

a. an open rectangular module which is in edge-to-edge relation to an adjacent module and is supported on a beam;

b. a closure slab overlying and covering each module;

c. wedges made of flexible isotropic synthetic rubber material which will resist cold flow between contiguous surfaces of said module and said slab, said wedges having frictionally roughened inclined surfaces facing each other and being dimensioned so that, under an increase in load of 50 kg./m.^{2} on the slab, they are compressed in the range of 0.2 to 0.5 mm., whereby the total thickness of the wedges is changed by relative axial movement thereof; and,

d. mortar which seals contiguous edges of adjacent modules and slabs.

2. Concrete building elements as claimed in claim **1**, wherein said inclined surfaces of the wedges are frictionally roughened by means of a groove and a rib.

3. Concrete building elements as claimed in claim **1**, wherein said inclined surfaces of the wedges are frictionally roughened by means of mutually engaging transverse notches.

* * * * *