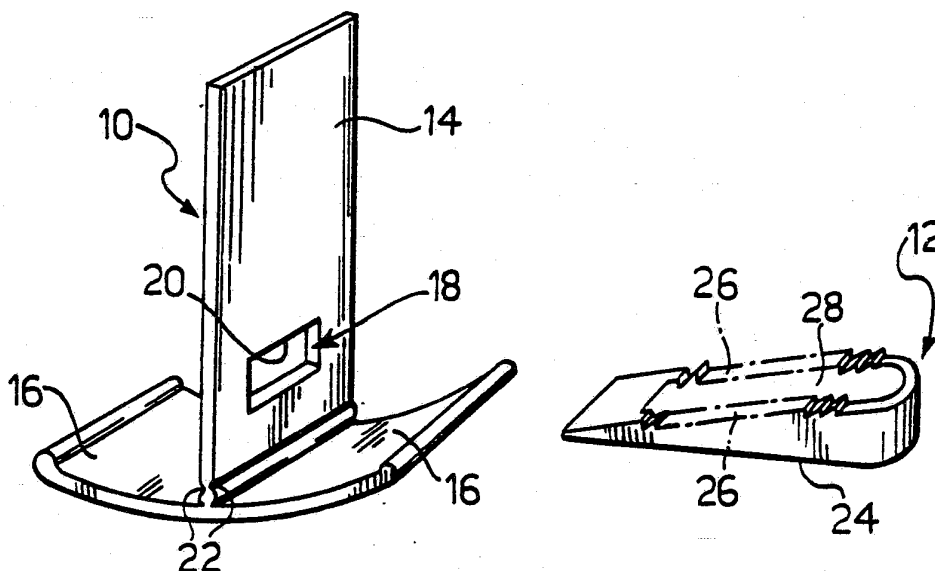




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁵ : E04F 21/20	A2	(11) International Publication Number: WO 92/14012 (43) International Publication Date: 20 August 1992 (20.08.92)
(21) International Application Number: PCT/EP92/00262 (22) International Filing Date: 6 February 1992 (06.02.92) (30) Priority data: TO91A000078 8 February 1991 (08.02.91) IT (71) Applicant (for all designated States except US): ACCORNERO, Guido [IT/IT]; Via Vincenzo Vela, 28a, I-10128 Torino (IT). (71)(72) Applicants and Inventors: MAROCCO, Giuseppe [IT/IT]; Via Ettore De Sonnaz, 21, I-10121 Torino (IT). ZALONZINI, Italo [IT/IT]; Via Lesna, 17, I-10142 Torino (IT). (74) Agents: SACONNEY, Piero et al.; Jacobacci-Casetta & Perani S.p.A., Via Alfieri, 17, I-10121 Torino (IT).		(81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), DK (European patent), ES (European patent), FR (European patent), GB (European patent), GR (European patent), IT (European patent), JP, LU (European patent), MC (European patent), NL (European patent), SE (European patent), US. Published <i>Without international search report and to be republished upon receipt of that report.</i>

(54) Title: A DEVICE FOR LAYING RIGID FLOORING MODULES



(57) Abstract

The device comprises a disposable element (10) and a wedge (12) both preferably of a cheap plastics material. The disposable element (10) has a T-shaped cross-section with a central portion (14) and at least two opposite yielding arms (16). The wedge (12) can be inserted in the hole (18) and has a flat levelling surface (24). The disposable element (10) is intended to be placed with its arms (14) under two consecutive flooring modules and immersed in the adhesive (mortar or resin) for fixing the modules to a floor foundation, and with its central portion (14) extending above the upper faces of the modules through a gap. One edge (20) of the hole (18) is arranged so as to be above the upper faces of the modules. The wedge (12) can be inserted in the hole (18) between this edge (20) and the upper faces of the modules with its flat levelling surface (24) in engagement with the upper faces so as to clamp the two modules between the wedge and the yielding arms (16).

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A device for laying rigid flooring modules

The present invention relates to the laying of rigid flooring modules, in which the modules are laid edge to edge one after another on a floor foundation with the interposition of an adhesive.

Throughout the present description and in the claims, the term "module" is intended to indicate modular flooring elements for rooms, terraces and the like, constituted by tiles, blocks, tesserae and even quite large slabs of marble, granite, agglomerates, ceramics, granulates, flagstones, laminated elements with decorative marble surfaces, etc.

These elements are usually supplied in the form of modules whose dimensions are such that they can be handled easily by the workers laying the floor, or cut to the particular measurements defined for a specific design. The modules are fixed to the floor foundation, for example a concrete floor, by cement-based adhesives (mortars) or adhesives based on two-component resins, for example polyurethane or epoxy resins.

In conventional systems, the workman spreads the adhesive on a region of the floor foundation which is intended to receive one or more modules, places the modules on the adhesive beside one another, spreads more adhesive, places further modules thereon, and so on. The walking surface of the finished floor is represented by the plurality of modules arranged side by side. Once the longer or shorter period of time necessary for the adhesive to set has elapsed, the flooring is fixed firmly to the foundation.

With the known technique, the final result is affected by the accuracy of the dimensions of the modules, the quality of the adhesive, its behaviour during the setting stage, the quality and evenness of the floor foundation and, to a very large extent, by the ability and skill of the workman. A good final result produces a flat walking surface with as few discontinuities in level, such as small steps, errors of alignment, etc., between the modules as possible. A good final result thus depends on a combination of factors all of which help to increase the cost of the operation.

In order to facilitate the laying and to make the inevitable laying inaccuracies less obvious, the modules are often produced, particularly in the case of marble or granite tiles, with chamfered or rounded edges which not only disguise defects represented by differences in the levels of adjacent modules but, in particular, make such steps imperceptible underfoot.

Regardless of the ability of the workman laying the floor, one cause of bad laying which is often disregarded is the shrinkage of the adhesive (mortar or resin) during the setting stage and, to an even greater extent, the different amounts of adhesive under the various modules. The workman evaluates the amount of adhesive spread under each module by eye, taking into account any unevenness of the floor foundation.

When a two-component resin is applied to the floor foundation, the workman laying the floor spreads it with a toothed spatula. Although this technique provides a surface which can support modules of different thicknesses by the greater or lesser

deformation of the lines of resin created by the spatula, it will be understood that the amount of resin under the modules may differ from one module to another.

Whether they are mortars or resins, the adhesives used are deformable fluids and have specific shrinkages which are proportional to their masses. Thus, the weight of the flooring which bears on the adhesive when the laying is finished but before the structure is stabilised as a result of the setting of the adhesive often changes the position of the adhesive from that defined by the workman laying the floor. This creates further imperfections.

The object of the invention is to provide a device which enables even a fairly inexperienced person to lay rigid flooring modules so that the modules in the final floor produced after the adhesive (mortar or resin) has set are precisely coplanar without steps between one module and another, even when the modules do not have chamfered or rounded edges.

According to the invention, this object is achieved by means of a device characterised in that it comprises, on the one hand, a disposable element which has a substantially T-shaped cross-section, the leg of the T being constituted by a removable, flat central portion and the crosspiece of the T being constituted by at least two opposite yielding arms, and in which the central portion has a hole, and, on the other hand, a wedge which can be inserted in the hole and has a flat levelling surface, the thickness of the central portion corresponding to the desired width of the gap to be left between adjacent edges of two consecutive modules,

the T-shaped disposable element being intended to be placed upside down with its arms immersed in the adhesive beneath two consecutive modules and its central portion extending above the upper faces of the two modules through the gap, the hole in the central portion having an edge which is uppermost in the laid position and is arranged to be above the upper faces of the modules, and the wedge being insertable in the hole between the upper edge and the upper faces of the modules with its flat levelling surface in engagement with the upper faces so as to clamp the two modules between the wedge and the yielding arms.

By virtue of this concept, modules laid successively are fixed to each other, before the adhesive (mortar or resin) has set, by several devices of the type claimed, these devices clamping their adjacent edges to keep the upper faces of the modules precisely coplanar adjacent those edges. After the adhesive has set, the part of each device which projects from the gap between adjacent modules can simply be removed, together with its wedge.

The devices according to the invention have the function not only of ensuring that the modules are coplanar, but also of determining the widths of the gaps between the modules and ensuring their uniformity. These gaps are then filled with the usual fillers which act as expansion joints.

Devices according to the invention may also have thicker or thinner central portions. For example, in order to produce expansion joints which are practically invisible, disposable elements with central portions less than a millimetre thick may be used whilst, for

aesthetic purposes, disposable elements with central portions even several millimetres thick may be used to produce a network of expansion joints whose appearance contrasts with that of the tiles.

The invention has been designed for application to slabs, tiles and similar modules without chamfered or rounded edges but can also be applied to modules, such as tiles, which are chamfered. Nevertheless, the devices according to the invention have the advantage that they facilitate the use of modules or tiles without chamfered or rounded edges which, as is known, produce a network of grooves in the flooring which house dirt that is difficult to remove.

Further characteristics and advantages of the invention will become clear from a reading of the detailed description which follows, with reference to the appended drawings, given by way of non-limiting example, in which:

Figure 1 is a perspective view of a disposable element and a wedge constituting a device according to a preferred embodiment of the invention, and

Figures 2 to 5 are schematic sections showing successive stages in the laying of flooring with the aid of devices according to the invention.

With reference to Figure 1, a device according to the invention comprises a disposable element, generally indicated 10, and a wedge, generally indicated 12. The two elements 10 and 12 are preferably moulded from cheap plastics material.

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The disposable element 10 has a generally T-shaped cross-section. The leg of the T is constituted by a thin, flat central portion 14, for example, 1 mm thick. The crosspiece of the T is constituted by two opposite arms 16 which are also thin. The arms 16 are yielding and, as shown, are preferably resiliently flexible and shaped like the arms of a leaf spring with their concave sides facing the central portion. The purpose of this configuration will be explained further below.

A rectangular hole 18 is formed in the central portion 14 at a certain distance from the arms 16. One straight edge of the hole 18 which is furthest from the arms 16 is indicated 20. This edge is parallel to the arms 16.

Between the hole 18 and the arms 16, immediately adjacent the roots of the arms, the central portion 14 has a weakened portion formed by opposite transverse grooves 22 which, as will be seen, facilitate the removal of the central portion.

The wedge 12 has two opposite converging surfaces 24 and 26 which are inclined to each other by an angle of the order of $7-10^{\circ}$. The surface 26 is recessed at 28 and its opposite edge portions, also indicated 26, are notched with saw teeth whose rear slopes face the end where the surfaces 24 and 26 converge.

As will be seen better below, the wedge 12 can be inserted in the hole 18 so that its teeth engage the edge 20 of the hole and its flat surface 24 engages the slabs, tiles or other modules for levelling purposes, when they have just been laid.

In Figures 2 to 5, a floor foundation, such as a floor slab to be covered, is indicated 30. A layer of adhesive (mortar or resin) spread on the base is indicated 32. A module which has already been laid on the layer of adhesive 32 and a subsequent module which is being laid are indicated 34a and 34b respectively.

As can be seen in Figure 2, a disposable element 10 has been associated with the edge of the module 34a which faces the module 34b, one of its arms 16 being under that edge and immersed in the layer of adhesive 32 and its central portion 14 being placed against the edge of the module 34a.

In Figure 3, the module 34b has been laid on the layer of adhesive 32 with its edge which faces the module 34a superimposed on the other arm 16 of the element 10 and bearing against the central portion 14 which acts as a spacer between the two modules 34a and 34b and determines the width of the gap between them. Figure 3 also shows the wedge 12 which is about to be inserted in the hole 18 in the central portion 10.

In Figure 4, the wedge 12 has been fully inserted in the hole 18 with its flat surface 24 against the upper faces of the modules 34a and 34b. In this condition, the notched surface 26 of the wedge 12 engages the edge 20 of the hole 18 and opposes any movement of the wedge 12 from its correct position. The flexible arms 16 are deformed resiliently by virtue of their leaf-spring-like configuration and, on the one hand, together with the wedge 12, clamp the two adjacent edges of the modules 34a and 34b resiliently and, on the other hand, take up any differences in the thicknesses of the edges so as to ensure that their

upper faces are exactly coplanar.

In Figure 5, the layer of adhesive 32 has set so that the two modules 34a and 34b are fixed in position with their adjacent edges firmly coplanar. At this point, the wedge 12 or the central portion 14 of the disposable element 10 is simply kicked or struck by the foot or a hammer to break the central portion 14 at its weakened part 22.

The weakened part 22 is very near the roots of the arms 16 and is therefore below the lower faces of the modules. The central portion 14 is thus almost completely removed, leaving the desired gap between the two modules 34a and 34b which will then be filled, in known manner, by the material of the joint. The two arms 16 and the "stump" of the leg 14, however, remain immersed permanently in the set adhesive 32.

One or more devices 10 are intended to be used on each side of a module during laying. Two devices are normally sufficient to ensure good alignment with sides up to 50-60 cm long. For modules with longer sides more than two devices 10 may be used, preferably arranged at regular intervals.

The laying system using the devices 10 according to the invention also has the advantage that it enables slightly bent or deformed slabs or other modules to be laid correctly within the limits allowed by the elasticity of the material. If, for example, it is noticed during the laying that two modules whose adjacent sides are already coplanar close to the devices 10 are slightly out of level in another region, another device 10 can simply be inserted in that region for corrective purposes.

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CLAIMS

1. A device for laying rigid flooring modules in which the modules (34a, 34b) are laid edge to edge one after another on a floor foundation (30) with the interposition of an adhesive (32), characterised in that it comprises, on the one hand, a disposable element (10) which has a substantially T-shaped cross-section, the leg of the T being constituted by a removable, flat central portion (14) and the crosspiece of the T being constituted by at least two opposite yielding arms (16), and in which the central portion (14) has a hole (18), and, on the other hand, a wedge (12) which can be inserted in the hole (18) and has a flat levelling surface (24), the thickness of the central portion (14) corresponding to the desired width of a gap to be left between the adjacent edges of two consecutive modules (34a, 34b), the T-shaped disposable element (10) being intended to be placed upside down with its arms (16) immersed in the adhesive (32) beneath two consecutive modules (34a, 34b) and its central portion (14) extending above the upper faces of the two modules (34a, 34b) through the gap, the hole (18) in the central portion (14) having an edge (20) which is uppermost in the laid position and is arranged to be above the upper faces of the slabs (34a, 34b), and the wedge (12) being insertable in the hole (18) between the upper edge (20) and the upper faces of the modules (34a, 34b) with its flat levelling surface (24) in engagement with the upper faces so as to clamp the two modules (34a, 34b) between the wedge (12) and the yielding arms (16).

2. A device according to Claim 1, characterised in that the yielding arms (16) of the disposable element (10)

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are resiliently flexible.

3. A device according to Claim 2, characterised in that the yielding arms (16) are shaped like the arms of a leaf-spring with their concave sides facing the central portion (14).

4. A device according to Claim 1, Claim 2 or Claim 3, characterised in that the wedge (12) has a notched surface (26) which converges with its flat surface (24) and is intended to engage the upper edge (20) of the hole (18).

5. A device according to Claim 4, characterised in that the notched surface (26) has a saw-toothed profile with teeth oriented so as to oppose the movement of the wedge (12) from the hole (18).

6. A device according to any one of the preceding claims, characterised in that the central portion (14) of the disposable element (10) has a weakened part (22) between the roots of the arms (16) and the hole (18) for facilitating the removal of the central portion.

7. A device according to Claim 6, characterised in that the weakened part (22) of the central portion (14) is arranged so as to enable the central portion to be removed completely from the gap between consecutive modules (34a, 34b).

8. A device according to any one of the preceding claims, characterised in that the disposable element (10) and the wedge (12) are of plastics material.

