



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication: **18.06.2003 Bulletin 2003/25** (51) Int Cl.7: **E01F 8/00**

(21) Application number: **01129944.3**

(22) Date of filing: **17.12.2001**

(84) Designated Contracting States:  
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU  
MC NL PT SE TR**  
Designated Extension States:  
**AL LT LV MK RO SI**

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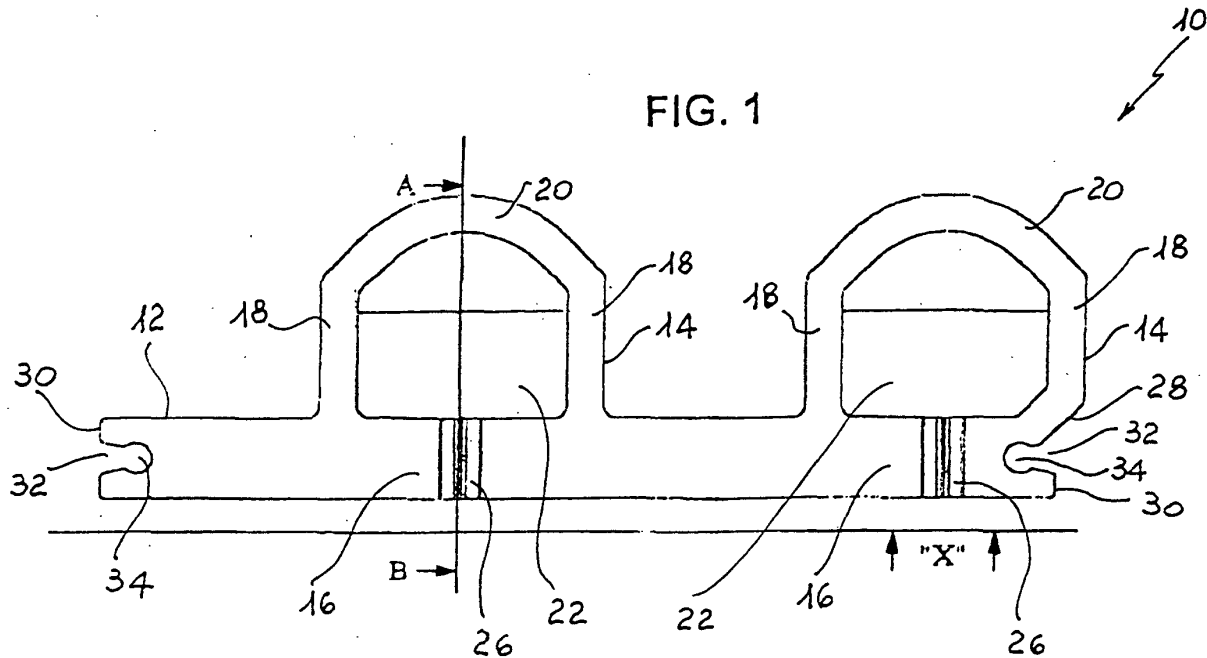
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(54) **Prefabricated modular element for the construction of continuous walls or noise-barriers**

(57) A prefabricated modular element (10), especially suitable to form continuous walls or noise-barriers, having a rectilinear or a mixtilinear development, obtained from concrete or other suitable materials, com-

prises a base (12) having a rectilinear development, and at least an integral container (4) which cantilevers from the front of said base, vertically oriented and forming a wall having a substantially rectangular profile with a height markedly shorter than its longitudinal extension.



## Description

**[0001]** The present invention relates to a prefabricated modular element for the construction of continuous walls or noise-barriers.

**[0002]** More particularly, the present invention relates to a prefabricated modular element from concrete, that can be connected either vertically or horizontally to other elements to form continuous walls with the function of noise-barrier, developed along linear or mixtilinear routes.

**[0003]** As is known, the problems concerning the control of noise that causes the so-called acoustic pollution, are increasingly felt and faced in various ways according to the situation. If, on the one hand, studies and researches have the orientation of damping and limiting noise at the source, operating directly on the apparatuses that generate them, on the other hand there has been at least attempted at circumscribing the phenomenon, utilizing specific barriers for the containment of sound emissions. This is the case of constructions that have been by now widely installed along lengths of the road network, especially in correspondence of or near habitation centers; roads and speedways as well as railways, are delimited every now and then by these walls which have the aim of partly adsorbing and containing the noise caused by vehicles, damping it drastically. The known walls and barriers in question are generally formed by several modular elements connected with each other, constituted by an alternation of linear or raised zones; the latter have a trough-type configuration to contain soil for seedlings and shrubs. In this way an aesthetic effect is obtained that limits substantially the negativity of the visual impact, besides contributing to damping sound waves because of the presence of vegetation.

**[0004]** However, the known noise-barriers have several severe drawbacks of both a structural and a functional order.

**[0005]** The connection of many modular elements involves, in fact, the use of special joints, but this solution is not sufficient to ensure the stability of the complex, if the barriers should develop for long heights, and therefore recourse must be had to support reinforcements, generally obtained from cement.

**[0006]** The construction of the barrier is therefore complex and laborious, determining a marked increase in the overall realization costs.

**[0007]** A further drawback of the known noise-barriers concerns the irrigation of the soil of the different troughs to keep in adequate conditions the seedlings and shrubs contained therein; even though resistant types of vegetation are selected, that require a minimum maintenance, it is all the same always necessary to feed water into said troughs, especially in the warmer periods when high temperatures are reached and the same wall or barrier accumulates and reflect much heat. It is therefore necessary to realize collaterally special water feed-

ing channels, which further complicates the construction and cause an increase in costs.

**[0008]** Object of the present invention is to obviate the above drawbacks.

5 **[0009]** More particularly, object of the present invention is to realize a prefabricated modular element especially suitable to form noise-barriers, wherein the connection with other like elements is realizable in a rapid and easy manner, without any necessity of introducing special joints.

10 **[0010]** A further object of the invention is to realize a modular element as defined above, suitable to form continuous walls also of great height, without requiring support reinforcements.

15 **[0011]** A not least object of the invention is to realize a modular element suitable to allow the adequate humidifying of the vegetation contained in said element.

20 **[0012]** A further object of the invention is to provide users with a modular element suitable to ensure a high level of noise damping, resistance and reliability in the time, and also such as to be easily and economically realized.

25 **[0013]** These and still other objects are achieved by the prefabricated modular element for the construction of continuous walls or noise-barriers of the present invention, especially suitable to form continuous walls or noise-barriers having a rectilinear or mixtilinear development, which, obtained from concrete or other suitable materials, is basically characterized in that it comprises a base having a rectilinear development and at least an integral container that cantilevers from the front of said base, vertically oriented and forming a wall having a substantially rectangular profile with a height markedly lower than its longitudinal extension.

30 **[0014]** The constructive and functional characteristics of the prefabricated modular element of the present invention will be better understood thanks to the following description, wherein reference is made to the attached drawings that represent a preferred non-limiting embodiment and wherein:

35 Figure 1 shows schematically a top view of the prefabricated modular element of the present invention;

40 Figure 2 shows schematically a cross-section along the line A-B of Figure 1 of the same element;

45 Figure 3 shows schematically a partial view of the rear of the same element;

Figure 4 shows said element seen from the top downwards, and the related connection means located, by way of example, in correspondence of one only side of said element;

50 Figures 5 and 6 show schematically as many possible angle arrangements of said element;

55 Figure 7 shows schematically a top view of said modular element according to a preferred and alternative embodiment;

Figures 8 and 9 shows respectively in perspective

view from the backside and front side, the modular element showed in figure 7;

Figure 10 schematically shows a top view of a portion of a noise - barrier constituted by a plurality of modular elements aligned, by way of example, along only one front.

Figure 11 schematically shows top view of a portion of a noise - barrier constituted by a plurality of modular elements aligned, by way of example, on both the opposite fronts.

**[0015]** With reference to the aforesaid figures, the prefabricated modular element of the present invention, indicated as a whole by 10 in Figure 1 and advantageously obtained from concrete, comprises a base 1 having a rectilinear development and at least an integral container 14 which cantilevers from the front of said base.

**[0016]** The latter defines a vertical wall having a substantially rectangular profile, of limited height and markedly lower than its longitudinal extension; container 14 has an irregular prismatic configuration, with the exposed front having an arched convex development. In the preferred embodiment of the figures, each modular element 10 is provided with two containers 14, spaced from each other along the base or wall 12, being however understood that said element 10 can include, with the suitable sizing, a different number of containers 14, developed on the same front or possibly on both the opposite fronts.

**[0017]** Each container 14 is circumscribed on the rear by a part 16 of base 12, wherefrom it cantilevers, laterally from opposite and parallel shoulders 18 and frontally from a frontal 20 having an arched convex profile; the internal cavity of containers 14 is indicated by 22. In correspondence of zone 16 of base 12 that delimits the rear of containers 14, a transversally extended slit 26 is obtained, formed starting from the upper edge 12' of base or wall 12, and extended downwards for a length almost equal to the half of the height of said zone 16; said slit is substantially aligned with the vertical axis of containers 14.

**[0018]** The latter, in the preferred embodiment of the figures, cantilever asymmetrically from wall 12, one of them being markedly set back with respect to a head of said wall, and the other one slightly protruding from the opposite head to which it is connected with a recessed beveling 28. Each of said heads, indicated by 30, is provided with a shaped recess, constituted by an opening or a tapered stress raising mouth 32 that extends into a seat having a substantially circular profile 34. Said recess, which extends for the whole height of wall 12 along heads 30, is suitable to engage with the vertically extended supporting means that constitute the load-bearing frame of the barrier formed by the approaching and superposition of many elements 10.

**[0019]** In detail, as is schematized in Figures 4-6, said supporting means are essentially constituted of a plu-

rality of double-flange 38-40 I-beams 36, that develop vertically from the ground and are suitably spaced from each other to insert with one of said flanges 38-40 into said shaped recesses of two adjoining elements 10.

**[0020]** As is schematized in Figure 5 and 6, the particular conformation of the recesses formed by opening or mouth 32 and the adjoining seat 34, obtained along heads 30 of wall 12, advantageously allows to orient in angular direction elements 10, to obtain barriers having a mixtilinear development; this is particularly useful as the morphology of the soil or the development of the road or the railroad can demand the realization of barriers that, on given points, must follow a curvilinear trend. The angle may be obtained with an anticlockwise direction, as show in Figure 5, or a clockwise direction, as shown by Figure 6, and is comprised, by way of indication, between 30° and 40° as a maximum value.

**[0021]** I-beams 36, having a substantially H-shaped section, have their foundation on conventional plinths (not shown); their overall height is preferably equal to or slightly higher than the total height of the noise-barrier to be realized. While flange 40 of said I-beams is inserted in recess 32-34 of each head of wall 12 of element 10, the other flange remains free and exposed to the rear front, opposed to containers 14, creating in this manner a line or several anchoring points for a covering and/or insulating paneling suitable to screen on the rear the barrier.

**[0022]** In this case, represented in figure 10 which shows a part of a noise - barrier constituted by modular elements 10, it is provided that between said paneling, identified by number of reference 46, and the rear front of walls 12 of elements 10, at least a layer of sound-absorbing material be included, such as for instance recycled wool fiber and/or rock fiber 50; such material, besides increasing the effect of sound wave damping, has the function of absorbing rainwater of which it impregnates.

**[0023]** As a consequence, also in periods of drought, the soil of containers 14 is constantly humidified as wool fiber releases progressively the water stored; slits 26 obtained on walls 12 of elements 10 cause said humid material to get in touch with the soil present in containers 14.

**[0024]** Figure 7 and more in detail figures 8 and 9, show schematically an alternative and preferred embodiment of modular element 10; according to such embodiment, the frontal of containers 14, indicated by 20', develops at least partly rectilinearly and parallel to walls 12, and is provided with a plurality of vertical ribs 42 having an arched convex profile. Said ribs, besides creating an interesting aesthetic effect, have the function of further damping sound waves, that strike a ragged instead of a smooth surface.

**[0025]** Figure 11 schematically shows a noise - barrier constituted by a plurality of modular elements 10, disposed and aligned on both the opposite front and back sides and connected with both flanges 38 - 48 of beams

- 36; even in this case this embodiment is advantageously provided the positioning of an intermediate layer of sound - absorbing and water impregnable material, indicated by 52.

**[0026]** As can be inferred from the above description, the advantages achieved by the invention are evident.

**[0027]** The prefabricated modular element 10 of the present invention allows to realize noise-barrier in an easy and rapid manner, does not require the use of special joints for the connection with the other elements; another advantage lies in that the barrier formed by said elements does not require reinforcing supports, the I-beams 36 founded on conventional plinths being sufficient for this purpose. The presence of slits 26 obtained in correspondence of containers 14 and the layer of material that can impregnate with rainwater also allows to keep suitably humidified the soil present in said containers, eliminating the need of providing for special water channels, so that the vegetation located therein does not suffer from even long draught periods.

**[0028]** However, the invention, as described hereinabove and claimed hereinafter, has been proposed only by way of non limiting example, being understood that the same is susceptible of modifications and variants, all of which falling however within the scope of the inventive concept.

**[0029]** For instance, the modular element 10 may have a different configuration and/or development, as concerns both base 12 and containers 14, with respect to what has been described by way of example; the same modular element may also be obtained according to a version that provides for the inversion of the right-left positioning of containers 14 with respect to base 12, where they develop from.

## Claims

1. A prefabricated modular element (10), especially suitable to form continuous walls or noise-barriers, having a rectilinear or a mixtilinear development, obtained from concrete or other suitable materials, **characterized in that** it comprises a base (12) having a rectilinear development, and at least an integral container (4) which cantilevers from the front of said base, vertically oriented and forming a wall having a substantially rectangular profile with a height markedly shorter than its longitudinal extension.
2. The modular element according to claim 1, **characterized in that** it has two containers (14) protruding from the front of said base (12) and asymmetrically spaced with respect to the opposite heads (30) of said base.
3. The modular element according to claim 1, **characterized in that** said heads (30) of base (12) have a shaped recess connecting supporting means (16), that develops throughout the whole height of said base, and which is constituted of a tapered stress raising mouth (32) that extends into a seat having a substantially circular profile (34).
4. The modular element according to any of the preceding claims, **characterized in that** said supporting means (36) are constituted of I-beams, vertically extended and founded on plinths, having a substantially H-shaped or double flange section (38-40), one of which is inserted in said recesses parallel or angular with respect to the longitudinal axis of element (10).
5. The modular element according to any of the preceding claims, **characterized in that** said containers (14) have an irregular prismatic configuration with the exposed front (20) having an arched convex profile.
6. The modular element according to any of the preceding claims, **characterized in that** said containers (14) have an irregular prismatic configuration with the exposed front (20) that develops at least partly rectilinearly and parallel with respect to wall (12), and is provided with vertical ribs (42) having an arched convex profile.
7. The modular element according to any of the preceding claims, **characterized in that** it has along base (21), in correspondence of its zone (16) that circumscribes the rear front of containers (14), at least a slit (26) transversally extended that develops from the upper edge (12') of said base and extends downwards, the height of said slit being almost equal to a half of the overall height of said base.
8. The modular element according to any of the preceding claims, **characterized in that** one of containers (14) slightly protrudes from the respective head (30) of base (12) and is connected through a beveling to said head.
9. The modular element according to any of the preceding claims, **characterized in that** to flange (38) or (40) of the I-beam (36) not inserted in the recesses of base (12) and protruding from the rear of the same, a paneling (46) is tied for covering and insulating the rear of a plurality of elements (10) vertically superposed and horizontally aligned to form a noise-barrier.
10. The modular element according to any of the preceding claims, **characterized in that** between said paneling and the rear of elements (10) vertically superposed and horizontally aligned to form a barrier, a layer (48) and/or (50) sound-absorbing and/or wa-

ter impregnable layer is interposed.

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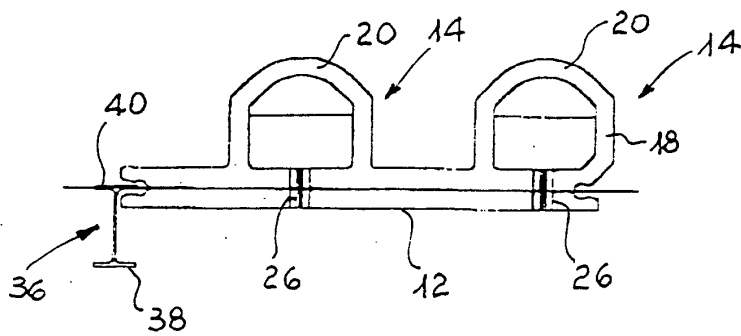
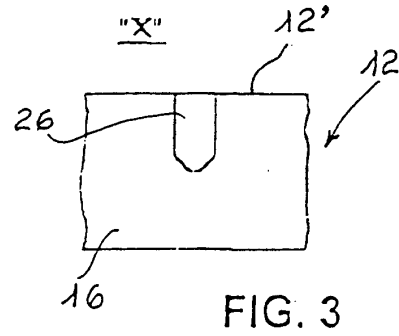
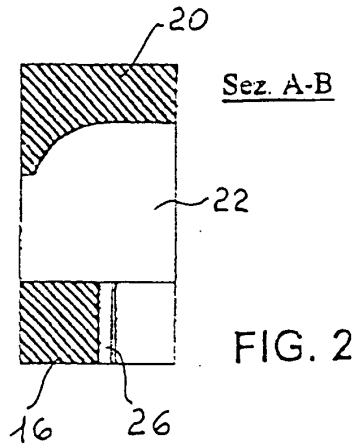
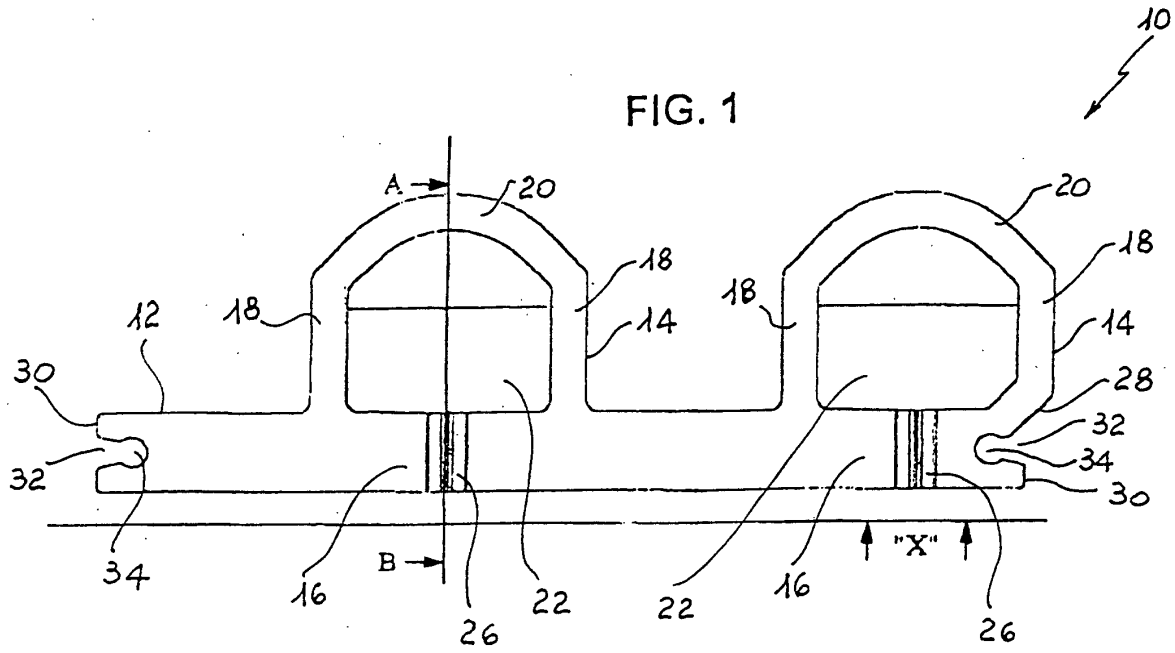
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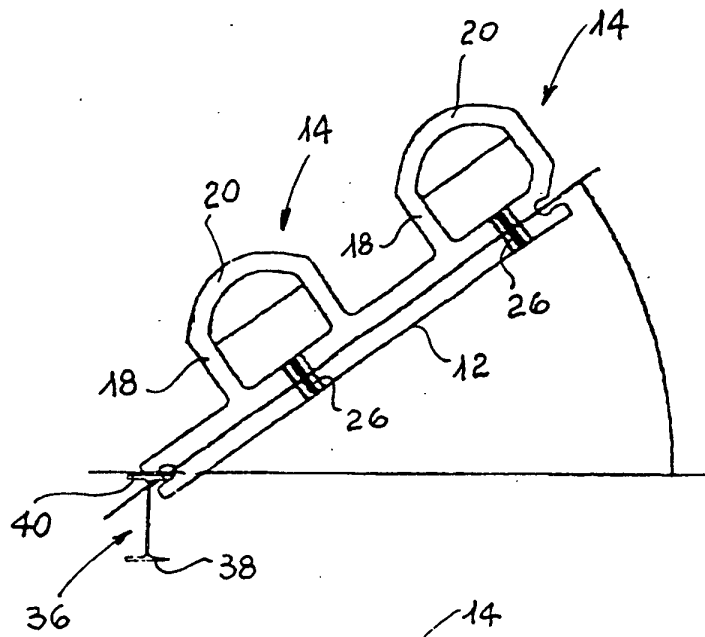


FIG. 5

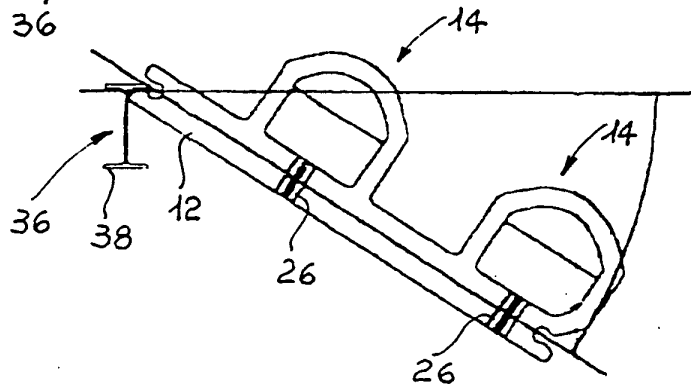


FIG. 6

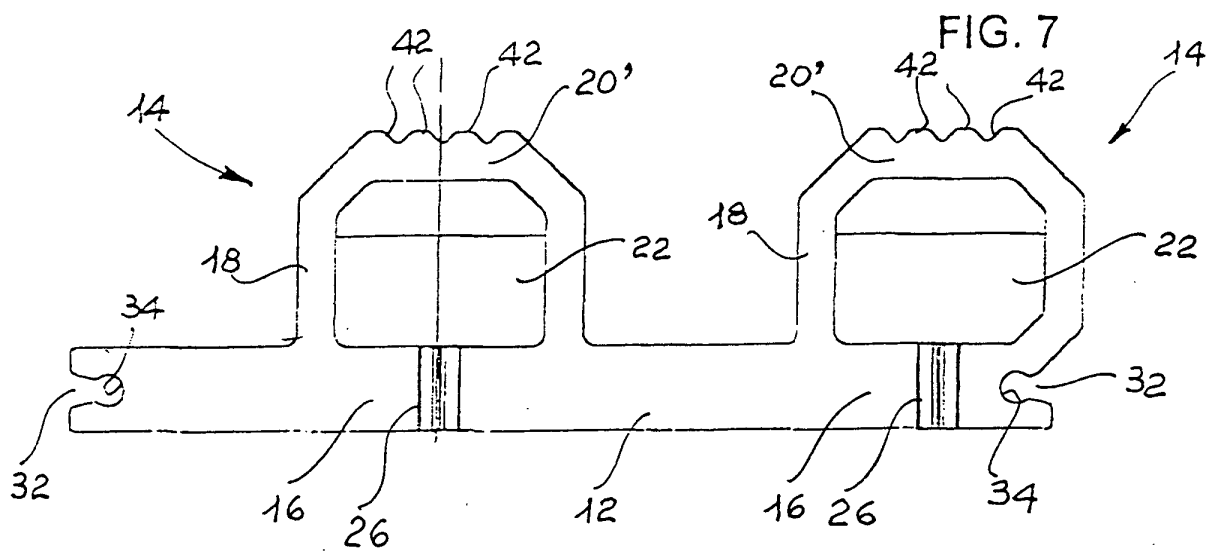
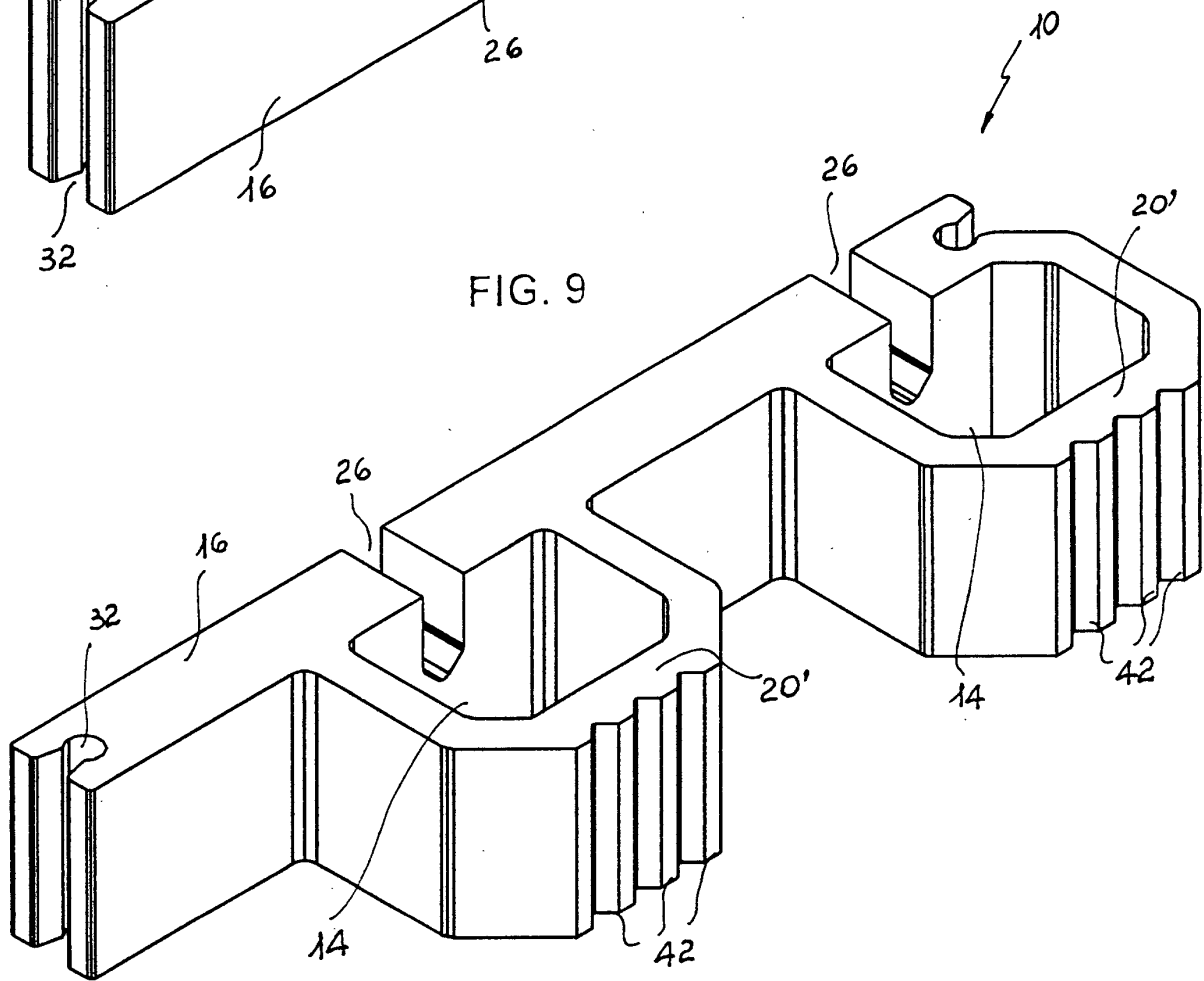
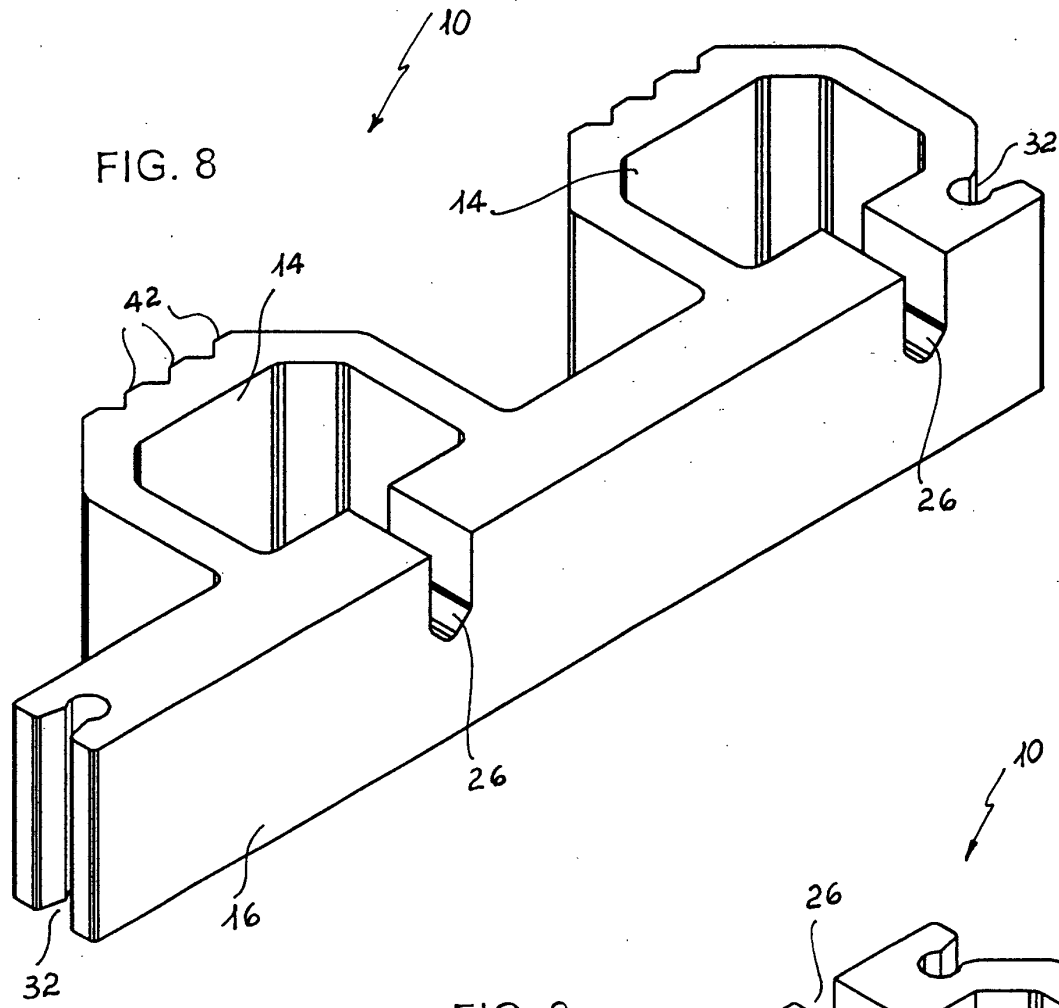


FIG. 7





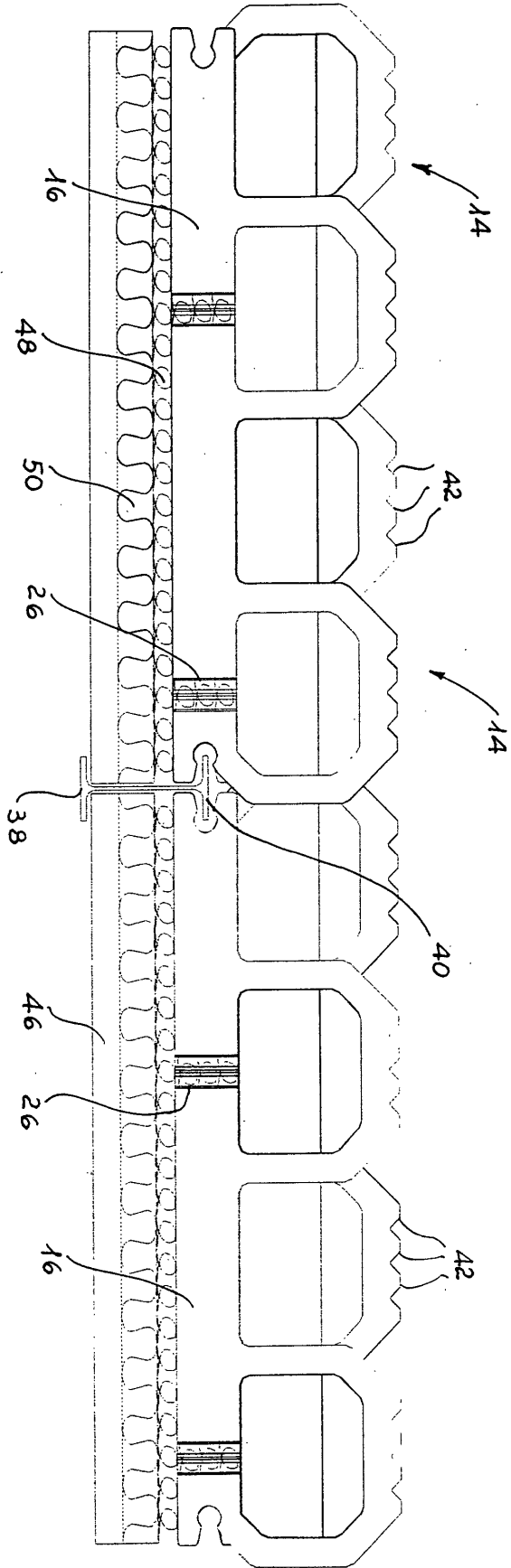
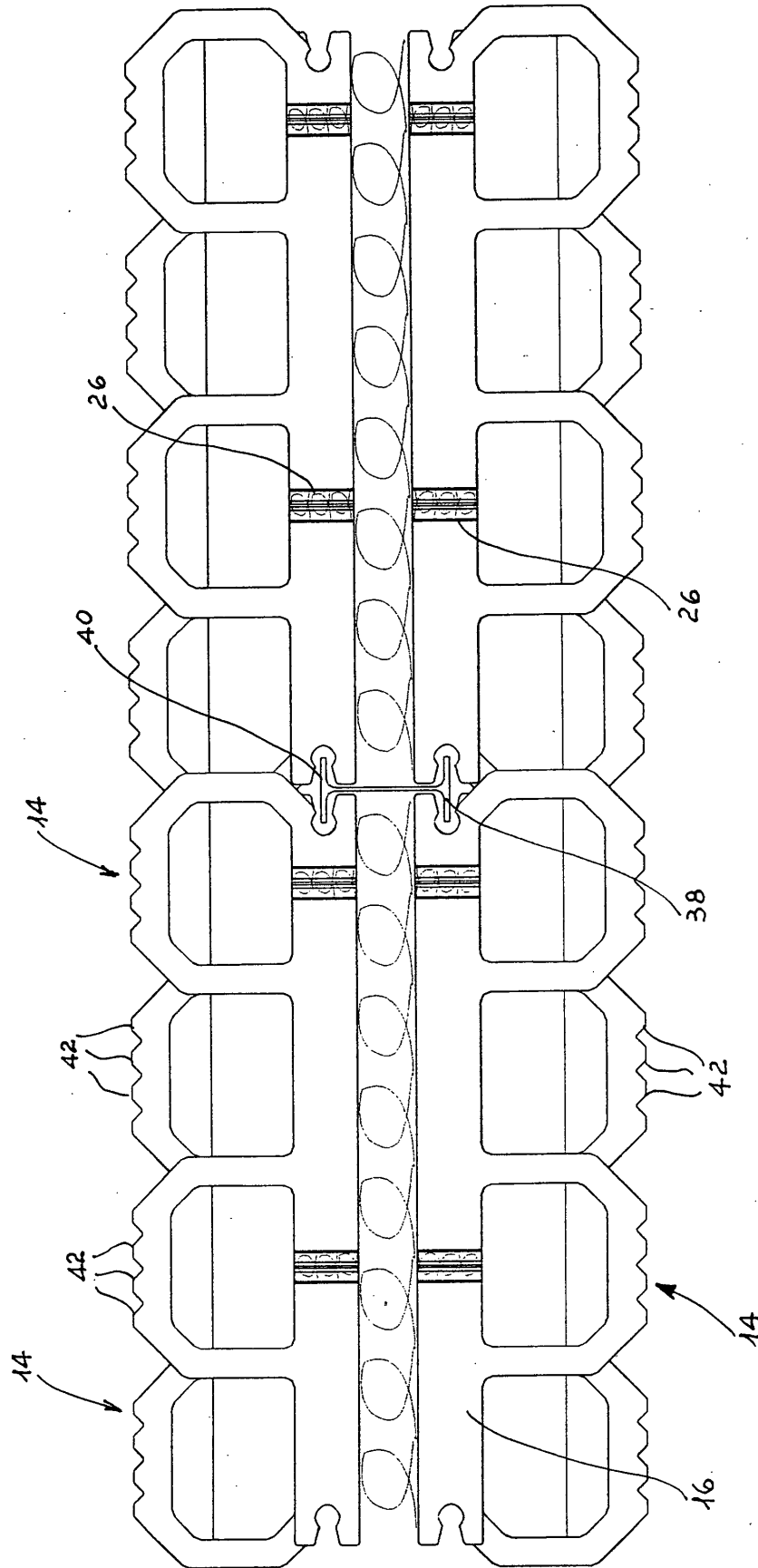


FIG. 10

FIG. 1 1





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EUROPEAN SEARCH REPORT

Application Number  
EP 01 12 9944

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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
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CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document	
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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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