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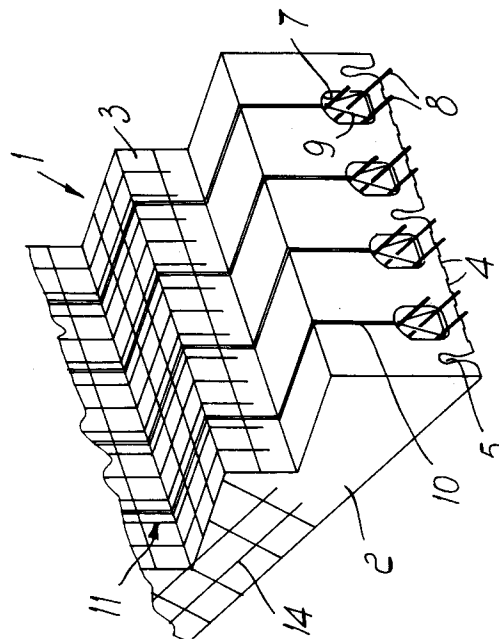
(11) Publication number:

**0 549 966 A1**

(12)

**EUROPEAN PATENT APPLICATION**(21) Application number: **92121454.0**(51) Int. Cl.<sup>5</sup>: **E04G 13/06**, E04F 11/02,  
E04C 2/20, E04B 5/36(22) Date of filing: **17.12.92**(30) Priority: **03.01.92 IT BO920001**(43) Date of publication of application:  
**07.07.93 Bulletin 93/27**(84) Designated Contracting States:  
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**16**  
**I-20123 Milano (IT)**(54) **Prefabricated component for building staircases.**

(57) The prefabricated component (1) for building staircases comprises a supporting element (2) made of foamed plastic material which extends longitudinally and is cut in the shape of steps (3) along one of its upper surfaces. The supporting element is provided with a plurality of longitudinal holes (7) which are meant for the insertion of respective metallic reinforcement frames (8,9) and are suitable to be filled with a concrete casting when installed, to provide respective beams for stiffening the supporting element.

**FIG.1****EP 0 549 966 A1**

The present invention relates to a prefabricated component for building staircases.

In the field of building, the need to build flights of stairs which generally have different dimensions, in terms both of extension and step shape, according to specific design choices, is known. For this purpose, conventional construction systems provide for the on-site execution of staircases in the required dimensions. However, this entails the use of considerable labor and requires relatively long work times.

On the other hand, the use of prefabricated components for building staircases has considerable limitations. Prefabricated components currently in use are in fact very heavy and are therefore difficult to transport and complicated to install. Said prefabricated components are furthermore unsuited for easy industrial production, since they must have different dimensions according to the construction requirements.

The aim of the present invention is to obviate these problems by providing a prefabricated component which allows to optimally build staircases, particularly facilitating the operations for transport and installation.

Within the scope of this aim, a further object of the present invention is to provide a component of the above described type which is simple in concept, has a low weight and great strength, and is versatile in use and relatively inexpensive.

This aim and this object are achieved, according to the invention, by the present prefabricated component for building staircases, which is characterized in that it comprises a supporting element made of foamed plastic material which extends longitudinally and is cut in the shape of steps along one of its upper surfaces, said element being provided with a plurality of longitudinal holes intended for the insertion of respective metallic reinforcement frames and suitable to be filled, when installed, with a concrete casting, to produce respective beams for stiffening said supporting element.

The details of the invention will become apparent from the detailed description of a preferred embodiment of the prefabricated component for building staircases, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a perspective view of a portion of the prefabricated component according to the invention;

figure 2 is a side view of a flight of stairs built by means of said component;

figure 3 is a transverse sectional view of said stairs.

With particular reference to the above figures, a prefabricated component for building staircases is generally designated by the reference numeral 1.

The prefabricated component 1 is constituted by a supporting element 2 made of foamed material, such as polystyrene, which extends longitudinally and is cut in the shape of steps 3 along one of its upper surfaces. More particularly, the supporting element 2 is obtained from a piece of foamed material which is shaped like a parallelepiped and is cut in steps at the median plane by means of appropriate electronically-controlled devices suitable to vary as required the rise and tread dimensions of the steps 3. In practice, therefore, two mutually symmetrical supports of the above type are obtained simultaneously from a single piece of foamed material. This allows to maximally limit manufacturing waste, with optimum use of the material.

The lower surface of the support 2, which is meant to be inclined when installed, has a series of longitudinal grooves 4 which are arranged side by side so as to give a sort of undulated appearance to said surface. The grooves 4 extend over the entire length of the component.

A plurality of openings 5 which extend longitudinally over the entire length of the component is furthermore defined at the lower surface of the support 2. In the illustrated case, for example, said openings 5 are defined at the median section and proximate to the sides of the supporting element 2.

The openings 5 extend along longitudinally vertical planes, and their cross-section has a central narrowing, so as to define insertion seats for respective reinforcement rods 6. The openings 5 are in fact conveniently suitable to be filled, during the preparation of the prefabricated components, with a concrete casting so as to define beams for the reinforcement of the supporting element 2.

Said supporting element 2 is provided with a plurality of longitudinal holes 7 which are uniformly distributed along its transverse cross-section and extend parallel to the lower surface of said element.

Respective reinforcement beams are inserted in the holes 7 and are constituted by longitudinal rods 8 which are connected by brackets 9 on transverse planes; for example, the brackets 9 are folded in the shape of a triangle, and the rods 8 are arranged at the corners of said triangle. The holes 7 are meant to be filled with a concrete casting when installed, as specified hereinafter.

Conveniently, the holes 7 are defined with a single cutting operation by means of said electronically-controlled devices. This operation therefore cuts respective slots 10 which are connected, on longitudinally vertical planes, to the upper surface of the support 2. A pair of electrowelded metallic nets 11 and 12 with rectangular mesh is associated with the supporting element 2; said nets extend respectively at the upper step-like sur-

face 3 and at the lower grooved surface. In particular, the upper metallic net 11 is folded so as to follow the profile of the steps 3, whereas the lower metallic net 12 conveniently has its longitudinal rods arranged respectively at the grooves 4 of the support 2 (see figure 3).

The metallic nets 11 and 12 are mutually connected by means of iron elements 13 which are driven transversely through the narrow portions of the support 2 (see figure 2). Essentially, the metallic nets 11 and 12 form a sort of lattice in which the support 2 is interposed.

Further metallic nets 14 of the above type are furthermore associated with the sides of the support 2, at least on the sides of the staircase which are to possibly remain in view after installation. The described component has a very low weight and can therefore be transported and installed very easily, without resorting to special equipment. In particular, the component which defines a staircase of normal size can be easily carried manually and installed by two workers.

During installation, concrete is cast into the holes 7, which have been provided beforehand with the related metallic reinforcement frames. Respective beams for stiffening the component are thus defined and give adequate strength to the flight of stairs.

The surfaces of the component which are in view, particularly the lower and lateral surfaces, are then covered with an appropriate layer of plaster 15. The metallic nets are embedded in said layer of plaster 15. The upper step-like surface of the staircase is instead covered with an appropriate covering material 16.

The metallic nets associated with the supporting element 2 are furthermore suitable to spread the loads which act on the staircase. For this purpose, said metallic nets are appropriately embedded in a layer of cement.

The described prefabricated component ultimately allows to optimally solve the problems linked with the building of staircases and the like, by virtue of the lightness and strength characteristics which facilitate its installation.

The prefabricated component furthermore lends itself to industrial production, since it can be manufactured so as to comply with the different constructive requirements.

The supporting element made of foamed material is in fact obviously cut to the required dimensions by means of appropriate instructions given to the automatic cutting devices, varying its extension and proportions. For example, it is possible to envisage the construction of wider staircases by arranging two or more prefabricated components of the above described type side by side in a modular manner.

In the practical execution of the invention, the materials employed, as well as the shapes and dimensions, may be any according to the requirements.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

## Claims

1. Prefabricated component (1) for building staircases, characterized in that it comprises a supporting element (2) made of foamed plastic material which extends longitudinally and is cut in the shape of steps (3) along one of its upper surfaces, said component having a plurality of longitudinal holes (7) which are meant for the insertion of respective metallic reinforcement frames (8,9) and are suitable to be filled with a concrete casting when installed, for the execution of respective beams for the stiffening of said supporting element.
2. Component according to claim 1, characterized in that a pair of electrowelded metallic nets (11,12) is associated with said supporting element, said nets extending respectively at the upper surface and at the lower surface, the upper metallic net being folded so as to follow the profile of said steps.
3. Component according to claim 2, characterized in that said metallic nets are mutually connected by means of iron elements (13) which are transversely driven through narrow portions of said supporting element, so as to form a sort of lattice in which said supporting element is interposed.
4. Component according to claim 1, characterized in that a plurality of openings (5) is defined in said supporting element at its lower surface, said openings extending on longitudinally vertical planes and being suitable to define insertion seats for respective reinforcement rods (6), said openings being intended to be filled with a concrete casting during the preparation of the prefabricated component, to produce beams for reinforcing said supporting element.
5. Component according to claim 1, characterized in that the lower surface of said supporting element has a series of longitudinal grooves

(4) which are arranged side by side so as to give a sort of undulated appearance to said surface.

6. Component according to claim 1, characterized in that it provides for the application, when installed, of a layer of covering material (15,16) on the outer surfaces of said supporting element, respective metallic nets associated with said surfaces being meant to be embedded in said covering material.
7. Component according to claim 1, characterized in that said holes (7) are uniformly distributed transversely to said supporting element on a plane which is parallel to the lower surface of said supporting element and have reinforcement frames inserted in them, said reinforcement frames being constituted by longitudinal rods (8) which are arranged like the corners of a polygon and are connected by brackets (9) which are folded on planes which are transverse to said rods.

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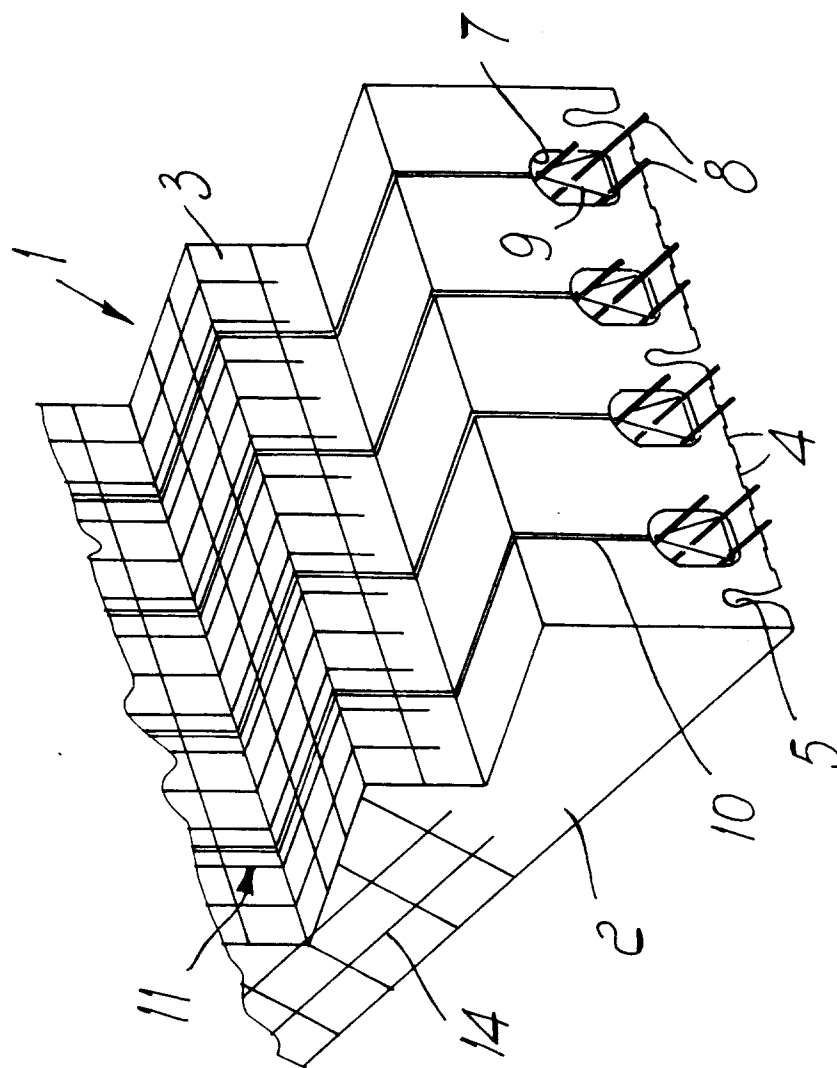
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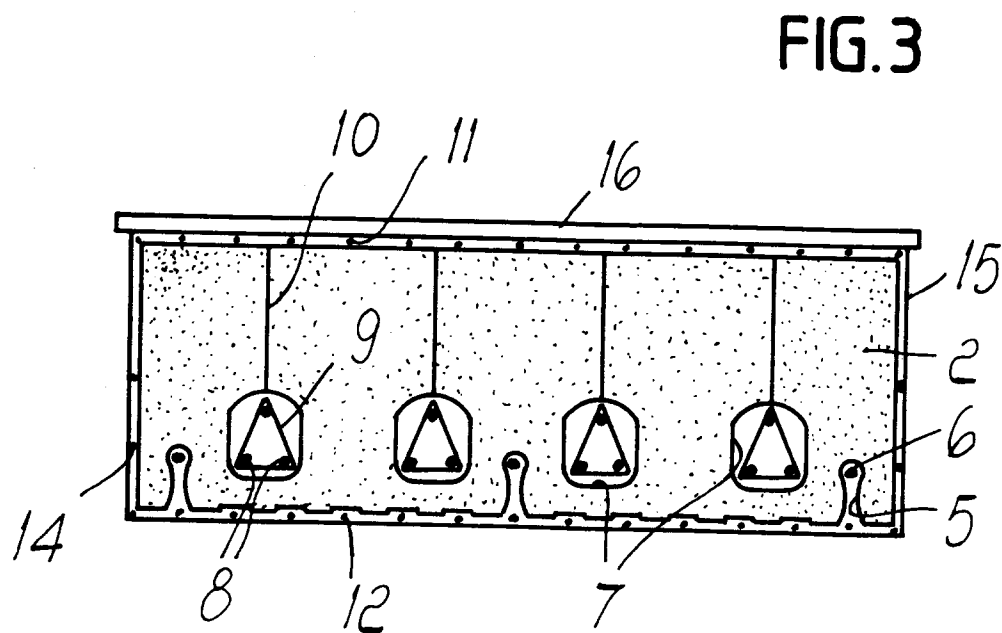
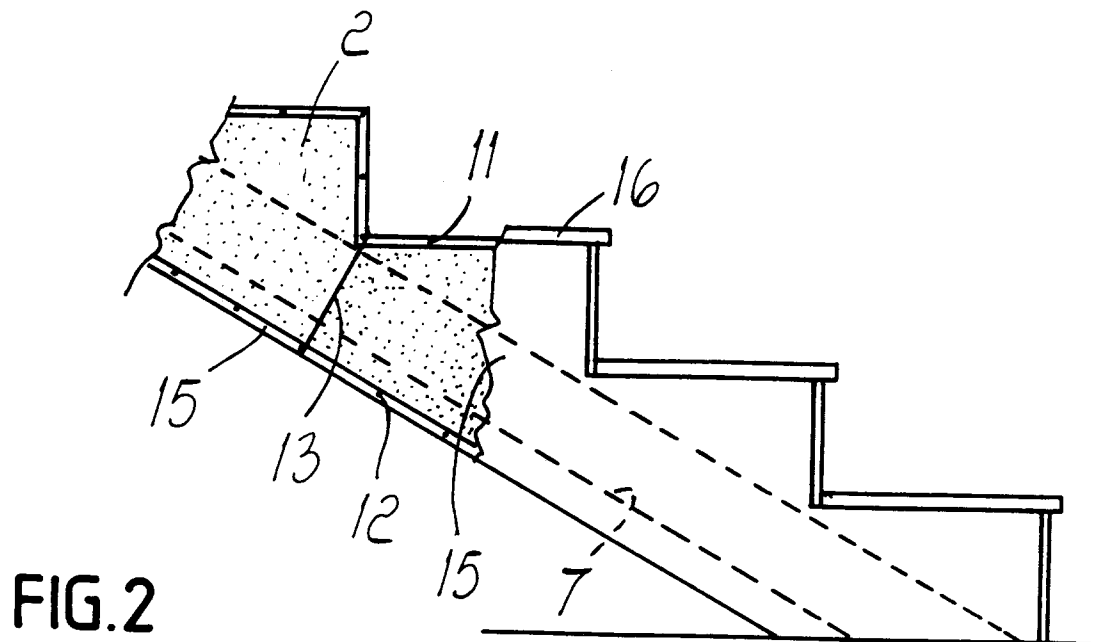
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FIG.1







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## EUROPEAN SEARCH REPORT

Application Number

EP 92 12 1454

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	DE-A-2 705 231 (FILIGRANBAU ZENTRALE FÜR TECHNIK UND ORGANISATION) * claims; figures * ---	1	E04G13/06 E04F11/02 E04C2/20 E04B5/36
A	FR-A-2 399 514 (JOANNES) * page 1 - page 6; figures * ---	1,2,3,6	
A	FR-A-1 563 687 (SECAIL) * the whole document * ---	1	
A	DE-A-3 332 645 (RASTRA) ---		
A	DE-A-1 928 399 (SÜLLHÖFER) ---		
A	FR-A-2 361 512 (JOANNES) ---		
A	GB-A-630 329 (WELSCHEN) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			E04G E04F E04C E04B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 01 APRIL 1993	Examiner VIJVERMAN W.C.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		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	