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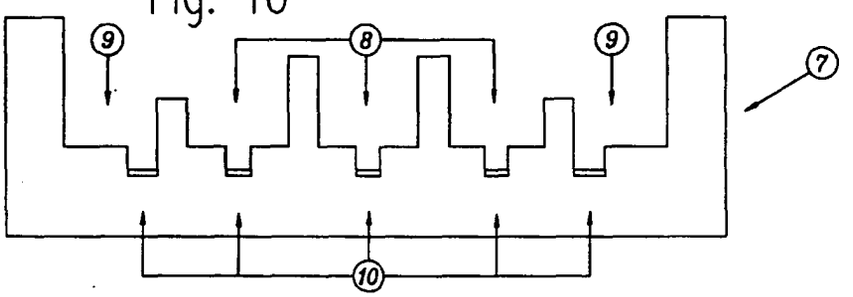
(71) Applicant: **Ferrari Ezio**
26014 Romanengo (IT)

(72) Inventor: **Ferrari Ezio**
26014 Romanengo (IT)

(54) Element for the positioning of reinforcing bars and trestles in concrete joists

(57) A metal element for making both in the factory and on the work site beams for floors, decking or other structures, that ensures the exact positioning of the longitudinal reinforcing iron or irons and of the trestle during the assembly, casting, vibrating and seasoning phases.

Fig. 10



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Description

[0001] This invention concerns the construction of an element in metal or in another material to make seats for reinforcing irons and making trestles for use in the formation of joists in cement brick, concrete or another material, either manufactured in the factory, prefabricated or made and cast during work for use in the building field for the construction of floors, decking, or other structures, the relative constructional and applicational system.

[0002] The prior-art joists that are generally used in building have the shape of an equilateral or isosceles triangle and the most commonly used are those in cement brick.

[0003] To make prior-art joists in cement brick certain components are assembled, namely a series of bases, generally in brick, until the necessary length is reached, longitudinal reinforcing irons and metal trestles are inserted therein and concrete is then cast to unite everything. Different types of brick bases are used.

[0004] There are the traditional ones that have a smooth internal base, others squashed on the internal base so as to create an internal bulge to be used to keep the longitudinal reinforcing iron in a raised position, there are those equipped with a metallic clip inserted into the brick before the firing thereof to keep the reinforcing iron in a raised position and other types.

[0005] The sequence of the phases described above clearly shows the disadvantages of the prior art that one wishes to overcome, namely the impossibility of checking and maintaining exact position of the longitudinal reinforcing irons or of the trestles placed inside the notch of the base during the phases of assembly, casting, vibration and seasoning.

[0006] This is due to four reasons:

1) during the assembly phases the reinforcing iron may shift because it is merely resting in the notch of the bases and can therefore move diagonally in relation to the axis of the joist, move against a side of the trestle or in the case of two or more irons they may move against one another;
2) during the phase of casting the concrete between the bases the same disadvantages may occur again due to the stress caused by processing;
3) to homogenise and compact the concrete poured into the bases, it is all subjected to a period of strong vibrations; and it is during this period that all the elements that make up the joist move as do the reinforcing irons and the trestle, which are free to move, so that the disadvantages described above occur again;
4) the two longitudinal irons that make up the trestle then adhere to the sides and to the bottom of the fired bases, which prevents proper covering thereof with the concrete.

[0007] The aim of this invention is to provide an element that enables certain spatial positioning of the reinforcing irons and of the trestle in relation to their optimal positioning both during the assembly phase, the casting phase, the vibration phase and the seasoning phase.

[0008] The invention also enables other aims to be achieved, namely:

1) ensuring and maintaining precise positioning of the longitudinal reinforcing irons in relation to their theoretical position;
2) ensuring correct positioning of the trestle that makes up the joist;
3) ensuring the required covering of concrete in all directions both around the individual longitudinal reinforcing irons and around the trestle;
4) ensuring the distance between the single reinforcing irons and the trestle;
5) fully integrating the invention with the bases.

[0009] All these aims ensure that the joist thereby obtained is at the highest level of the state of the art, efficacy and efficiency.

[0010] According to the invention, this result is achieved by the simple conformation of the invention.

[0011] This is inserted between two bases and thanks to its feet it rests on the internal bottom thereof.

[0012] At this point it is already ready to receive the reinforcing irons and the trestle by fixing them into their seats.

[0013] Unlike other methods, only three elements are required to achieve the preset aim, i.e. two at the opposite ends of the joist and one about halfway along.

[0014] Ensuring the correct depth of concrete around the irons not only preserves them from rust and from corrosion by chemical agents in the environment but also fulfils the basic condition and principle on which collaboration between the concrete and the iron is based.

[0015] This is an essential condition for optimising adhesion tension between the reinforcing iron and the concrete that makes up the joist; the bond thereby achieves maximum adhesion in order to counter the tangential tensions along the reinforcing irons and the respective slipping in relation to the surrounding conglomeration.

[0016] It is equally important to accurately position the trestle that makes up the joist because many calculators also include the two stringers that make up the trestles in the reinforcing iron area within the joist.

[0017] A simple example will now be given to better explain the problem.

[0018] If a joist has to be made in which a reinforced section of more than 1000 cm2 is required, an iron with a 12 mm diameter and a circumference of 37.704 mm or two irons with a diameter of 8 mm and a circumference of 25.136 mm can be used, that together amount to 50.272 mm.

[0019] However, if the reinforcing iron with a diameter of 12 mm adheres to the trestle as in Fig. 7, its surface

wetted by the concrete will be reduced from 37.704 mm to 30.852 mm; whereas if the two irons with a diameter of 8 mm rest against one another as in Fig. 8, there will be a surface wetted by the concrete equal to 41.136 mm, thereby in both cases noticeably reducing the adhesion surface between the iron and the concrete, reducing the surface respectively to one iron with a diameter of 9.57 mm in the first case and to 2 irons of 6.55 mm in diameter in the second case.

[0020] The above exposition proves that the aim of the invention has been fully achieved without particular, burdensome or additional processing in a simple and economical manner.

[0021] The trestles that are used in prior-art joists consist of three longitudinal irons placed at the top of an upturned 'V' that are united together by V-shaped brackets by means of welding or another prior-art technique according to custom whereas the reinforcing irons rest in the chamber of the base, where the trestle formed as above is also inserted.

[0022] The element that is the subject of the invention consists of a metal plate that is die-cast and suitably bent to obtain a series of feet and notches.

[0023] It is placed between two bases and by means of the tongues turned 90° that are known as feet it rests on them whilst the band is fixed between them.

[0024] The three central notches have the specific aim of acting as a support, a groove to create a suitable distance around the longitudinal reinforcement iron or irons.

[0025] The two places at the end of the element are on the other hand the seats of the stringers that constitute the trestle.

[0026] All these seats enable the set aim to be achieved.

[0027] Further advantages and characteristics of the invention and the procedure for making the products are clear from the detailed disclosure that follows, which is provided merely by way of non-restrictive example referring to the attached drawings wherein:

Fig. 1 is a diagrammatic representation of a portion of a prior-art trestle wherein 1 indicates the longitudinal reinforcing irons and 2 indicates the brackets;

Fig. 2 is a diagrammatic representation of the longitudinal reinforcing iron identified by 3;

Fig. 3 shows a diagrammatic representation of a prior-art base identified by 4, which can be made from different materials, preferably brick, wherein 6 identifies the chamber of the base, wherein the components of the prior-art joist are placed;

Fig. 4 shows a prior-art joist assembled ready to receive the concrete cast;

Fig. 5 shows a prior-art joist assembled and completed with a cast identified by 5;

Fig. 6 shows a transversal section of a prior-art joist assembled and completed with a cast;

Figs. 7 and 8 show two of the possible disadvantages that may occur in the prior-art joist regarding the longitudinal reinforcing irons and the positioning of the prior-art trestle, which disadvantages we intend to eliminate;

Fig. 9 shows a further possible disadvantage that we intend to eliminate, i.e. the possibility that the reinforcement iron 3 is arranged transversally in relation to the chamber 6 of the base and is therefore not aligned on the joist, furthermore resting on the bottom of the chamber 6 of the base as in Figs 7 and 8;

Fig. 10 shows a front view of the element that is the subject of the invention, identified by 7, more precisely by a metal belt, a simple die-casting operation removes the parts that are used to create the seats for the longitudinal irons identified by 8, for the trestle identified by 9 and creates the cuts for the feet identified by 10 and bent 90° in a subsequent stage.

Figs 11 and 12 respectively show a top view and a side view of the element that is the subject of the invention identified by 7;

Fig. 13 shows an axonometric view of the element that is the subject of the invention identified by 7;

Fig. 14 shows the element adhering to a prior-art base with the reinforcing iron 3 inside the seats 8, which iron may be a sole iron, two irons or three irons indifferently, according to requirements, and the trestle in the seats 9, all ready to receive the cast of concrete for completion;

Fig. 15 shows the front view of a further method of making the element that is the subject of the invention identified by 11, wherein the element is made of plastic rather than sheet metal, therefore by means of a suitable mould seats 8 and 9, feet 10 and the other parts are made in just one operation;

Figs 16 and 17 respectively show a top view and a side view of the further method of making the element identified by 11 that is the subject of the invention;

Fig. 18 shows an axonometric view of the further method of making the element identified by 11;

Fig. 19 shows the element identified by 11 adhering to the prior-art base with the reinforcing iron 3 inside the seats 8 and the trestle in the seats 9, everything being ready for proceeding to make the products as per Fig. 14;

Fig. 20 shows another embodiment of the element that is the subject of the invention, identified by 12, inserted in the notch of the prior-art base with the reinforcing iron 3 inside the seats 8 and the trestle in the seats 9, everything being ready for proceeding to make the products as per Fig. 14;

Fig. 21 shows the front view of the element that is the subject of the invention as shown in Fig. 20, identified by 12, made of plastic or another material, therefore by means of a suitable mould the entire object is made in just one operation;

Figs 22 and 23 respectively show a top view and a

side view of the element that is the subject of the invention identified by 12;
Fig. 24 shows an axonometric view of the element identified by 12;
Figs 25 and 26 show how the elements, according to the embodiments of the invention set out above, can be used to make products of the type with trestle slabs with different lightening elements (hollow bricks, polystyrene elements, etc.) or cement-brick panels.

[0028] The dimensions and the materials used may obviously vary according to requirements.
[0029] Those having ordinary skill in the art will recognise additional modifications, applications and embodiments within the scope of the claims.

Claims

1. A metal element for making both in the factory and on the work site beams for floors, decking or other structures, **characterised in that** it ensures the exact positioning of the longitudinal reinforcing iron or irons and of the trestle during the assembly, casting, vibrating and seasoning phases.

2. An element according to claim 1 **characterised in that** said element consists of an appropriately modelled band in iron, steel or another material.

3. An element according to the previous claims **characterised in that** it is made from plastic material, synthetic material, composite material or natural material.

4. An element according to the previous claims **characterised in that** it serves the double function of being a seat of the longitudinal reinforcement iron or irons and of the trestle.

5. An element according to the previous claims **characterised in that** it is assembled simply through contact.

6. An element according to the previous claims **characterised in that** it can be adapted to any type of base in brick or another material.

7. An element according to the previous claims **characterised in that** it needs not be fixed to the single bases.

8. An element according to the previous claims **characterised in that** it needs not be fixed to each single base making up the joist.

9. An element according to the previous claims **characterised in that** it is used to make trestle slabs with any lightening element.

10. An element according to the previous claims **characterised in that** it can be used to make cement-brick panels.

11. A joist with the composition described above with reference to the attached drawings and as illustrated therein.

12. A joist with the composition described above with reference to the attached drawings and as illustrated therein, assembled without the use of cement as an element to unify it, in order to have a subsequent single jet of concrete for the formation of the joist and of the structure wherein they are used.

13. A joist with the composition described above with reference to the attached drawings and as illustrated therein, complete with a reinforcing iron and assembled with the use of cement or another product as a unifying element.

14. Floors, decking and other structures as described above, with reference to the attached drawings and as illustrated therein.

15. Components for making floors, decking and other structures as described above **characterised in that** it involves the use of products and elements according to the previous claims.

16. Structural details made with the use of the element or elements according to any one of the previous claims.

17. Structural details and method for the production thereof as described and illustrated in the previous claims.

18. Constructions made with structural elements according to any one of the previous claims.

Fig. 1

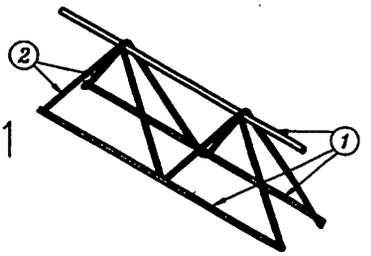


Fig. 2

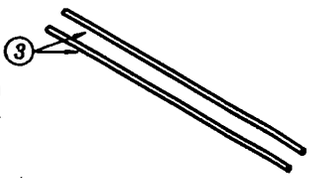


Fig. 3

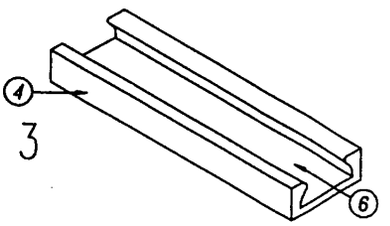


Fig. 4

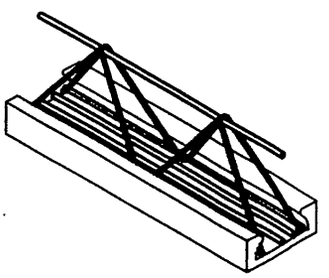


Fig. 5

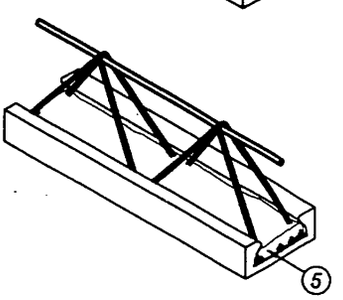


Fig. 6

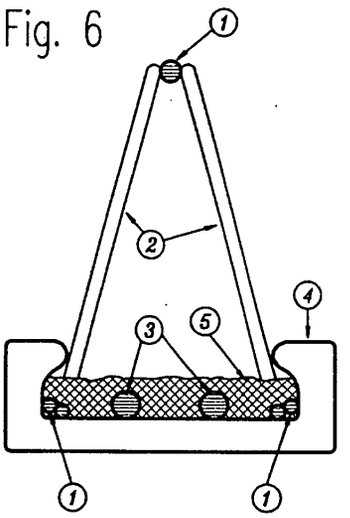


Fig. 7

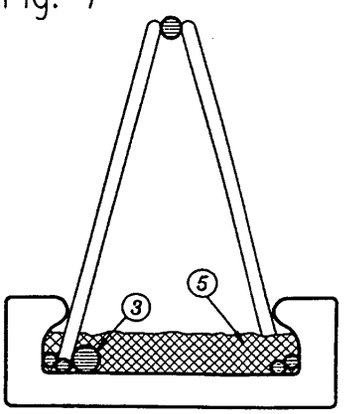


Fig. 8

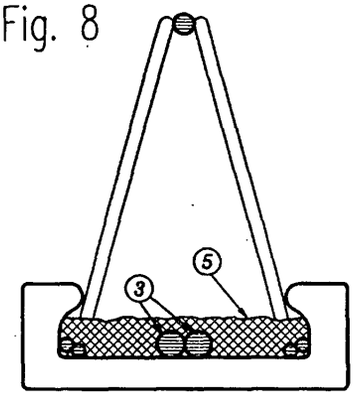


Fig. 9

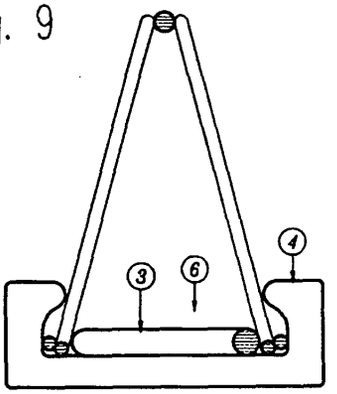
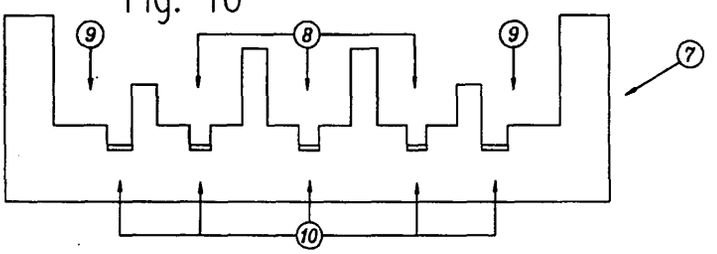


Fig. 10



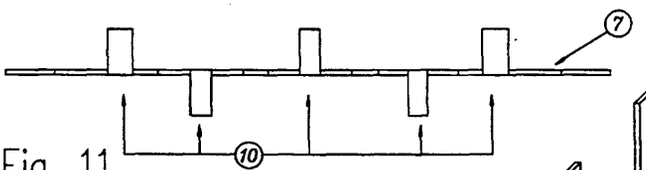
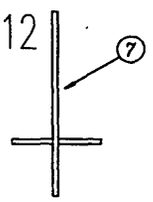


Fig. 11

Fig.12



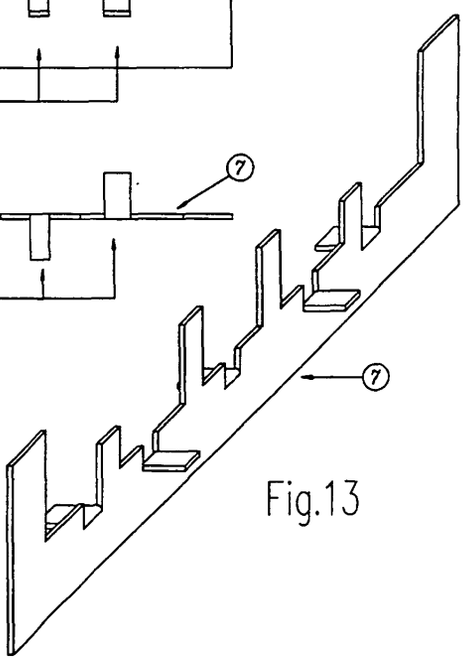


Fig.13

Fig. 14

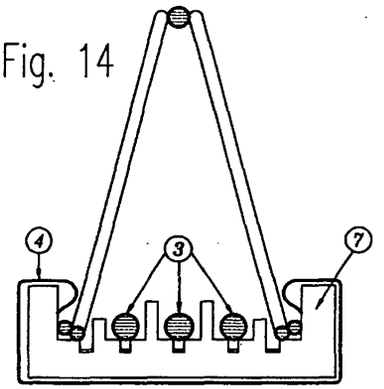


Fig.19

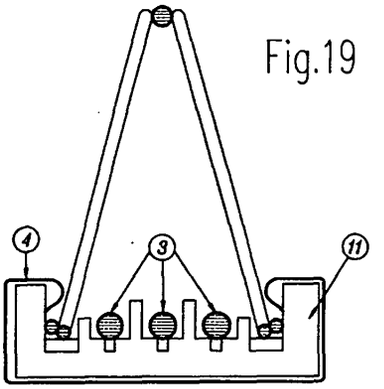
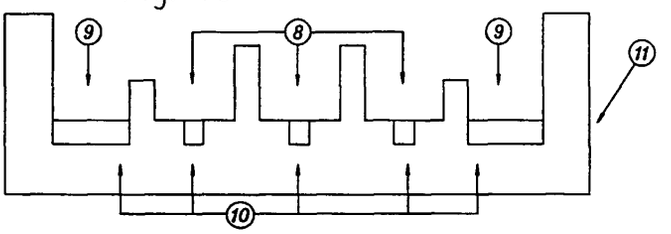


Fig. 15



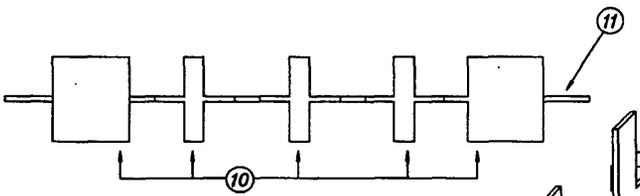
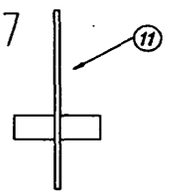


Fig. 16

Fig.17



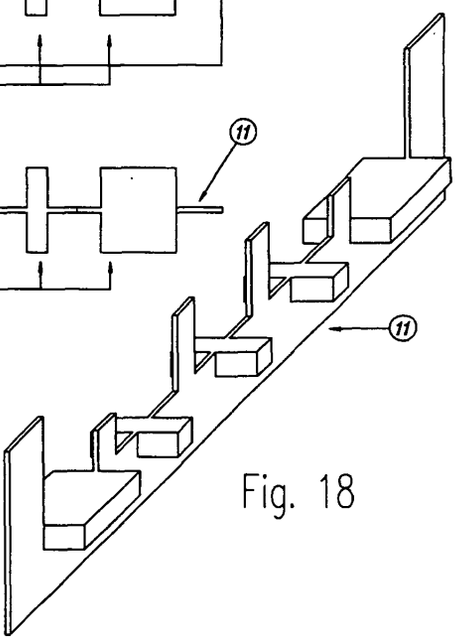


Fig. 18

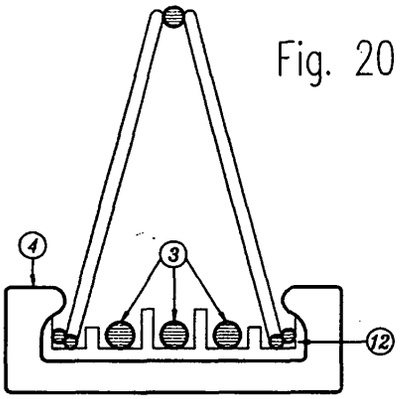


Fig. 20

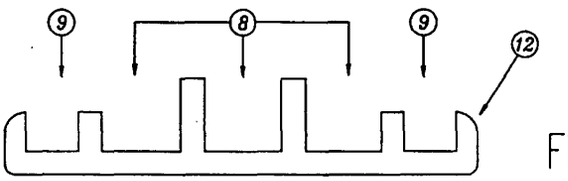


Fig. 21

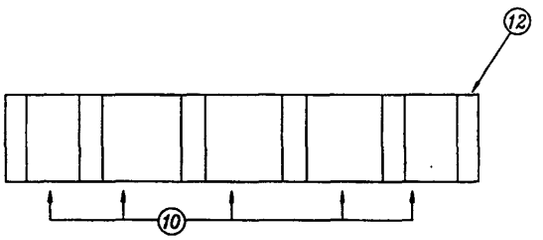


Fig. 22

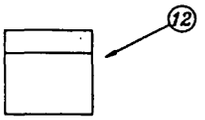


Fig. 23

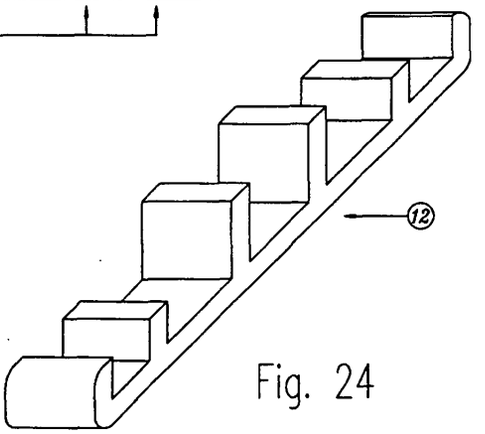


Fig. 24

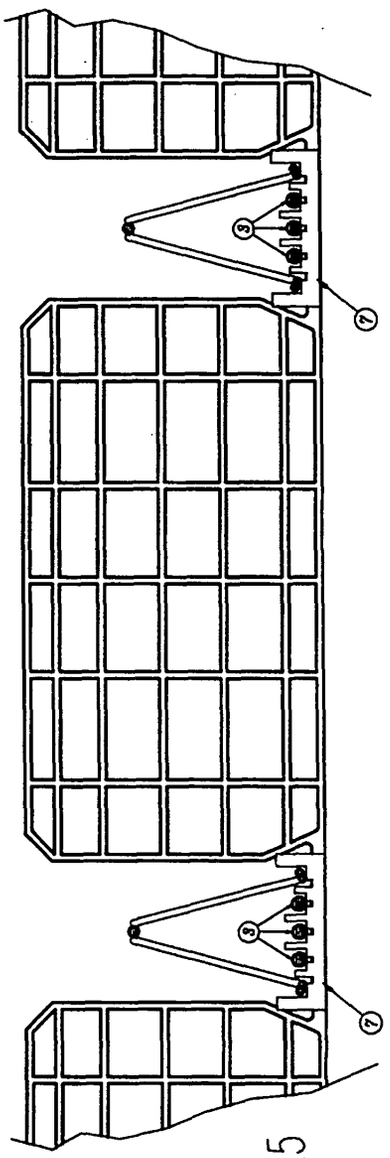


Fig. 25

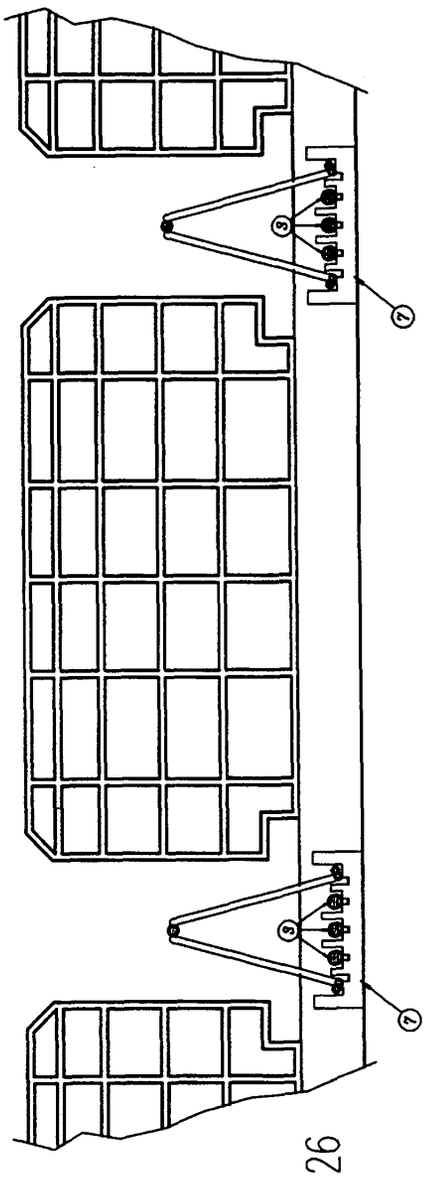


Fig. 26

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 42 5580

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.7)
X	DE 39 22 711 A (BUCHER) 24 January 1991 (1991-01-24) * abstract; figures *	1,2,4-18	E04C5/065 E04C5/18 E04C5/20 E04C5/16
X	FR 1 449 701 A (PAULIN) 14 November 1966 (1966-11-14) * page 1, column 1, last paragraph - column 2, paragraph 3; figures *	1,2,5-18	
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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
THE HAGUE	29 December 2003	Righetti, R

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
O : non-written disclosure
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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
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 03 42 5580

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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