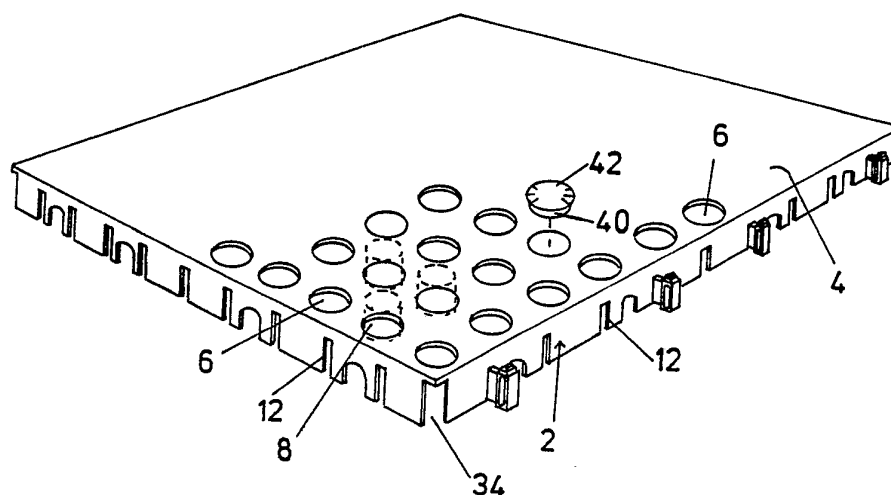




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<p>(21) International Application Number: PCT/DK92/00153 (22) International Filing Date: 13 May 1992 (13.05.92) (30) Priority data: 0892/91 13 May 1991 (13.05.91) DK (71)(72) Applicant and Inventor: BENTZON, Frank [DK/DK]; C.A. Thyregodsvej 105, DK-8230 Åbyhøj (DK). (74) Agent: K. SKØTT-JENSEN PATENTINGENIØRER A/ S; Lemmingvej 225, DK-8361 Hasselager (DK). (81) Designated States: AT, AT (European patent), AU, BB, BE (European patent), BF (OAPI patent), BG, BJ (OAPI pa- tent), BR, CA, CF (OAPI patent), CG (OAPI patent), CH, CH (European patent), CI (OAPI patent), CM (OA- PI patent), CS, DE, DE (European patent), DK, DK (Eu- ropean patent), ES, ES (European patent), FI, FR (Euro- pean patent), GA (OAPI patent), GB, GB (European pa- tent), GN (OAPI patent), GR (European patent), HU, IT (European patent), JP, KP, KR, LK, LU, LU (European patent), MC (European patent), MG, ML (OAPI patent), MN, MR (OAPI patent), MW, NL, NL (European pa- tent), NO, PL, RO, RU, SD, SE, SE (European patent), SN (OAPI patent), TD (OAPI patent), TG (OAPI pa- tent), US.</p>		<p>Published <i>With international search report. In English translation (filed in Danish).</i></p>

(54) Title: A FLOORING SYSTEM HAVING JOINABLE TILE ELEMENTS, PARTICULARLY PLASTIC TILES



(57) Abstract

A floor covering system comprising plastic tiles (2) provided with coupling parts made of lower receiver openings (12) for separate connector members (18), which render the tiles easily joinable and separable and are resistant to high separation forces. To the system may belong smaller modular tiles (32), which make it possible to lay out the flooring with integrated markings of lines, letters, figures or symbols provided in a durable and light fast manner with the use of small tiles cast with a deviating colour.

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A flooring system having joinable tile elements, particularly plastic tiles.

The present invention relates to a system of flooring tiles of plastic and of the type, in which the single tiles are designed as slightly resilient, user friendly flooring members to be laid out on hard floors, these tiles being adapted to be joined edge to edge by means of interengaging coupling members. Such a flooring system is disclosed in DK-C-155,616, in which it is specified that it is possible to achieve a very effective coupling together of the tiles by means of special, projecting coupling parts, which can be brought into engagement with complementary coupling means located retracted from the single side edges of the tiles. No doubt it will be possible to obtain a rigid coupling between the tiles, though in a rather difficult manner conditioned by a pronounced resilient flexibility of the tiles and/or rather high efforts for establishing the locking engagement, but it has been found as a considerable drawback that the coupling parts may be broken when the tiles are subjected to external forces, whereafter the relevant tiles will have to be changed out, as they will be without any holding connection with their neighboring tiles.

This is mainly explainable by the fact that climate conditioned heatings and coolings of the floor will produce different degrees of associated expansions and contractions of the layers constituted by the rigid support surface and the plastic tile layer thereon, respectively, whrereby, by way of example, a relative contraction, of the latter layer will imply large pulling forces in the coupling parts integrally

associated with the tiles. The coupling parts may be designed correspondingly heavily, but then without overcoming the associated productional problem relating to a desired minimizing of the material consumption of the coupling parts.

With the present invention the viewpoint is adopted that it is unecoomical to secure the tiles, generally, by making their coupling parts extremely heavy and resistant, as it will then be better to use non-integrated coupling parts, which, when breakage might occur, are easily replaceable, while it is also endavoured to make it easier to effect the coupling together of the tiles.

According to the invention use is made of tiles, the side edges of which are provided exclusively with receiver portions for separate coupling members, whereby these coupling members may consist of relatively small units for interconnecting the tiles. In cases where these units are broken it will be sufficient to mount new coupling members, without any changing out of the tiles themselves, whereby, for obvious reasons, a required repair will be much cheaper to carry out.

It has already been proposed to use separate coupling members between the tiles, but only in a manner such that the tiles would be difficult to join, and for the invention it is a further objective to provide a solution, whereby the coupling is easy to effect, inter alia in a manner such that the tiles may be premounted with coupling members on one pair of sides, such that these coupling members are readily engageable with the complementary sides of other tiles. By such a premounting the tiles will appear as full-cast units and yet be easy to mount, while the advantage is maintained that the coupling members will still be separately replaceable in case they should be broken by the said displacement forces.

On this background the invention provides for coupling members comprising a cross connector part having widened head portions of both ends thereof, while the tiles, along their side walls, are shaped with slots extending upwardly from the underside of the tile adapted to receive the cross connector part, while behind these slots the tiles are provided with vertical channel portions for receiving the said head portions in such a guided manner that a coupling member mounted by insertion into, that is upwardly into the channel portion will be held therein by a light clamping or snap lock action and will thus be stabilized in a position, in which it projects from the tile edge by half the length of the cross connector part, such that the projecting portion of the coupling member is ready to be connected with another tile by a relative movement, whereby the projecting part of the coupling member is introduced upwardly into the slot and channel portion of the other tile with the tiles located and thereafter locked in an edge-to-edge-position.

Hereby, for the laying of the tiles, it can be chosen to let the already laid-out tiles appear with the projecting coupling members at their free edges, whereafter further tiles can be added by a simple laying down, as by such a laying down edge to edge the complementary tile sides will enter into a locking engagement with the projecting portions of the coupling members. Inversely, the tiles may easily be separated at any desired place by a simple lifting of one tile edge from the neighboring tile edge.

Neither the edge slots nor the channel portions will need to extend up to top side plane of the single tiles, i.e. the tile top sides may extend all the way out to the edges of the tiles without being broken by these details.

For the invention it is a further aspect that a set

of tiles may comprise not only the regular main tiles, e.g. with a size of 25 x 25, but also a selection of smaller tiles having a side length of a suitable modular fraction, e.g. 5 cm, of the side length of the main tiles and provided with coupling parts that will make these small tiles suitable for being coupled together mutually and with the main tiles by means of the said coupling members.

With the use of such further, smaller tiles in the flooring system several important advantages will be achievable. Thus, it will be possible to establish a covering flooring along walls which are not perpendicular to each other or, by way of example, along arched pool edges, whereby it is possible to use smaller tiles having the same general appearance as the main tiles.

Alternatively, however, it may be chosen to make use of small tiles that will appear entirely different from the main tiles, e.g. by having a pronounced deviating colour, whereby in the main tile flooring it will be possible to 'draw' areas or lines of a fundamentally permanent character, e.g. in connection with floorings in sport courts. Such lines may particularly easily be rectilinear, but they can also be arched, and it will thus be possible to arrange the entire flooring with signs and symbols, e.g. for indicating floor numbers and escape route arrows on off-shore units or ships, where a corresponding floor painting will not be particularly durable. Likewise the flooring may be laid out with logo pictures, e.g. on large exhibition areas. The relevant markings will be so to speak undestructable, but if desired they can be easily removed or changed without any need of breaking up larger parts of the flooring.

According to the invention, a corresponding marking possibility may be achieved in another or an additional manner, namely when the tiles are of the type provided

with holes in their upper stepping layer, e.g. with a center distance of of 2-5 cm; in these holes can be inserted a holding pin portion a button shaped cover member, and these cover members may then be mounted in any desired pattern on the flooring, just as they can be mounted and dismounted without any interference with the flooring itself. With a center distance of 2.5 cm there will be one hundred holes in tiles measuring 25 x 25 cm, and thus it will be possible to work with a rather high degree of dissolution in the pattern. The bottoms may be produced in many different colours, but the same will apply to the said small tiles.

In the following the invention is described in more detail with reference to the drawing, in which:

Fig. 1 is a perspective view of a tile according to the invention,

Fig. 2 is a perspective view of an associated coupling member,

Fig. 3 is a perspective fractional view of a tile seen from below,

Fig. 4 is a sectional view of the joining area between two tiles,

Fig. 5 is a sectional view, seen from above, of the joint between two tiles,

Fig 6 is a plan view of a tile according to the invention,

Fig. 7 is a perspective view of a tile according to the invention, coupled together partly with a ramp element and partly with modular tiles of smaller sizes,

Fig 8 is a plan view of a tile edge with marked associations of tiles of different sizes,

Fig. 9 is a top view of a flooring with both 'normal tiles' and 'small tiles', and

Fig. 10 is a perspective view of a flooring laid out in a sports court.

The tile 2 shown in Figs. 1 and 3 is diecast and

has a top layer 4, in which, as well known, there is provided holes 6, the areas between these holes having depending, floor supported cylindrical carrier portions 8, the tile having correspondingly depending edge walls 10, In these walls a number of slots 12 is provided in a uniform manner along each of the edges. these slots being downwardly open and extending only over a lower part of the height of the edge wall.

Behind each of the slots there is arranged, confined by rib portions 14 depending from the top side 4, a downwardly open channel 16 which is somewhat broader than the slot and extends upwardly beyond the upper end of the slot.

To the tiles belong coupling members 18 as shown in Fig. 2 and adapted to be brought into engagement with the inner side of the edge wall 10 behind the slot 12 in a manner such that the coupling member can hold together two adjoining tiles. The members 18 have a middle beam portion 20, the length of which is approximately twice the thickness of the edge wall adjacent the slots 12, and opposed, wider head portions 22, which are both broader and upwardly higher than the beam portion 20. These head portions are provided with interfacing parallel inner sides 24, while at their upper ends they are preferably shaped in a slightly tapered manner.

As clearly apparent from Fig. 5 the head portions 22 are dimensioned relative to the channels 16 such that when they are introduced from below into the channels they will be held in the channels by clamping action, first of all in being clamped against a channel wall 26 located behind the rear of the slot 12. This implies that a coupling member mounted in only a single tile will be held in a position, in which it will project, in a well defined manner, just so far as to be suited for engaging a neighboring tile, which can be mounted simply by lowering of a slot area 12 over the projecting part

of the coupling member 18. Preferably use is also made of a snap locking, for which purpose the channels 16 are provided with rip portions 23, Figs. 3 and 4, which may cooperate with holding grooves 25 in the head portions 22.

This self holding engagement is conditional for the tiles being premounted with projecting coupling members 18, see Fig. 6, such that it is easily possible to couple similar neighboring tiles to the respective tile edges, viz. by a simple lowering of the new tiles over the projecting coupling members, whereby a coherent flooring will be easy to establish.

A further holding of the coupling part is achievable when the surface thereof is provided with groove or rib portions which may cooperate lockingly with complementary rib or groove portions inside the channels 16. This type of holding or locking means is advantageously arranged near the upper ends of the freely upstanding end portions of the head portions 22, as indicated by ribs 23 in Fig. 3 and grooves 25 in Fig. 2. For the same reason it will be suitable that both the head portions 22 and the channels 16 are designed so as to engage each other all over their cross section, whether this being rectangular or rounded.

It will be appreciated that the coupling members 18 with their broad head portions 22 will provide a connection which is considerably stronger than if the beam portion 20 was just a projecting integral part of the tile edge.

There can be used any desired number of joining places along each tile edge, even different numbers in the respective two main directions as suggested in Fig. 6; this may apply e.g. to foot path floorings, where the tiles may be subjected to forces that are higher in the longitudinal direction than in the transverse direction.

It will apply generally that an occurring break of

the joint between two tile edges may be repaired solely by a changing out of the broken coupling members 18, this being a lot cheaper than a replacing of the relevant tiles themselves.

Thus, in connection with the invention the tiles will be both easier to lay out and much cheaper to repair, should breaks occur, as also the tiles will be more resistant against breakage in the joining areas.

These areas may be arranged in such a manner, e.g. symmetrically about the middle of each tile edge, that the tiles may be coupled together alternatively directly edge to edge or with a desired bond between only partly overlapping tile sides.

The coupling members 18 may be dimensioned otherwise as shown, e.g. with an increased width relative to their height, and the tiles may be designed with reinforced edge portions at the relevant areas of engagement. According to the invention, however, it is important to adapt the dimensionings in a manner such that in case of strong breaking forces a possible break will occur in the coupling members and not in the associated parts of the tiles. The coupling members could well be designed so heavily, e.g. with a large width of the beam portion 20 and a small extra width of they may be connected both mutually and with adjoining tiles 2.

These small tiles 32 will be immediately suited for being laid as straightlined 'lines' in a flooring having normal tiles 2 placed at both sides of such a line, e.g. if the small tiles are made with a clearly deviating surface or colour.

The achievable marking effect, however, is not limited to such straight lines, as the small tiles 32 or many of them may appear with the same surface and colour character as the tiles 2, while in the flooring it will be possible, then, to use single and deviating small

tiles, which may be placed in any desired pattern among the other small tiles, i.e. also with a broken or arched configuration among these other tiles.

At the top of Fig.8 there is shown some tiles 2 seen against an edge thereof, and underneath there is indicated a 'large tile' 2' and two 'small tiles' 32 coupled to that edge. The tile 2' is placed in bond with the upper tiles 2, e.g. with coupling members 18 mounted at the slots 12a and 12b. Should a coupling member be mounted next to a corner of the tile 2', as in slot 12c, this particular coupling member should be removed. In connection with the invention, however, it has been considered that it may perhaps be found inconvenient to have to remove such surplus coupling members, inter alia because they might be desired at the same place later on; for that reason the tiles, see also Figs. 1 and 7, may be shaped with corner recesses 34 underneath the upper stepping side, such that coupling members 18 happening to be located adjacent a tile corner may be received in the adjoining corner recesses, though without any holding effect on these tiles.

Fig. 9 shows an example of the use of the said may comprise loose plugs 40 adapted for mounting by a self holding insertion into the holes 6 and having a flat head 42 that will hereby be placed flat against the top side of the tile. These plugs or 'buttons' 40 may be available in different colours, and it will be appreciated that this will provide for rich possibilities of arranging, in a durable manner, writing, drawing or decoration on the flooring, irrespective of a possible further use of the small tiles 32.

At certain places it may be desirable to improve the non-skid abilities of the tiles, and as shown this can be done as indicated in Fig. 3 by mounting of friction buttons 44 in some of the cylindrical carrier

portions 8, e.g. only a single button at each tile corner.

In Fig. 10 is indicated a sports court, in which there is provided marking lines with the use of small tiles 32, or of medium size tiles with the module 1x5 small tiles, or by using the marking buttons 40,42.

C L A I M S :

1. A floor covering system with tiles, preferably plastics tiles, operable to be coupled together, these tiles being provided with coupling means along their side edges. characterized in that the tiles are provided with uniformly designed edge areas all the way round, said edge areas comprising downwardly open channel means (16) located behind the respective edge surfaces (10) and operable to receive a head portion (22) of a coupling member (18), of which a thinner middle portion (20) projects outwardly through a vertical. downwardly open slot (12) in the edge wall (10) and has an outer, opposite head portion (22) for correspondingly engaging a neighboring tile.

2. A system according to claim 1, in which the head portions (22) of the coupling members (18) and the said channel means (16) are provided with complementary ribs and grooves (23,25) or other means for a safe retention of the coupling members, yet in a releasable manner.

3. A system according to claim 2, in which the tiles are premounted with projecting coupling members (18) along two adjacent sides.

4. A system according to claim 1, in which the interfacing sides (24) of the two opposed head portions (22) on the coupling members are arranged parallel with each other for cooperation with correspondingly planar, rearwardly facing edge wall portions at both sides of each of the vertical slots (12).

5. A system according to claim 1, in which the head portions (22) on the coupling members (18) are additionally noticeably higher than the middle portion (20), while the edge slots (12) are only as high as the middle portion (20).

6. A system according to claim 1, in which the coupling areas at the slots (12) are located with such a modular spacing that the tiles are joinable bondwise (Fig. 8), the tile corners preferably being provided with recesses (34) for a non-holding reception of such coupling members (18) which may occur on the adjoining tiles.

7. A system according to claim 1 and further characterized in comprising tiles (32) having a reduced size, but otherwise being correspondingly joinable with the larger tiles as well as with each other.

8. A system according to claim 7, in which the small size tiles are present both with the same colour as the other tiles and with one or more colours deviating therefrom.

9. A system according to claim 1, in which the tile top sides are perforated, characterized in that the system comprises marking buttons (40,42) for self-holding engagement with selected perforations (6).

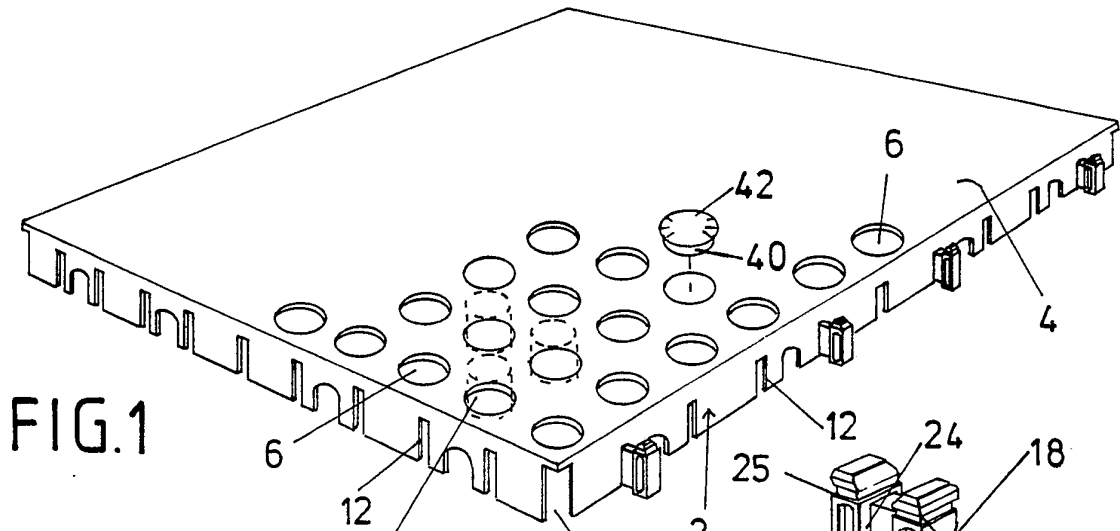


FIG. 1

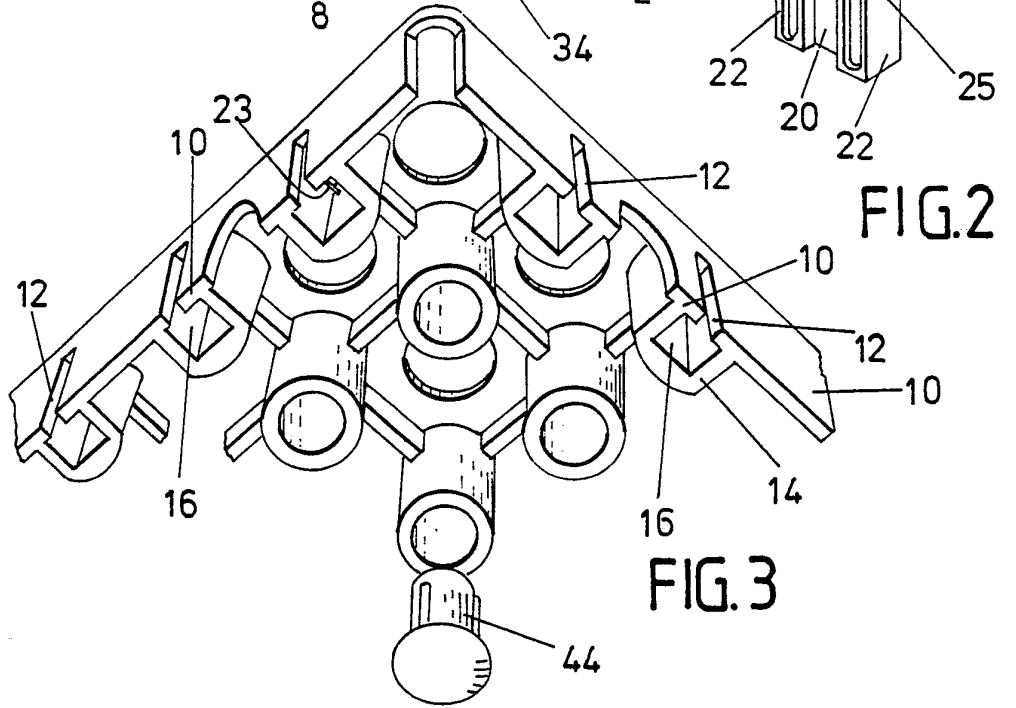


FIG. 2

FIG. 3

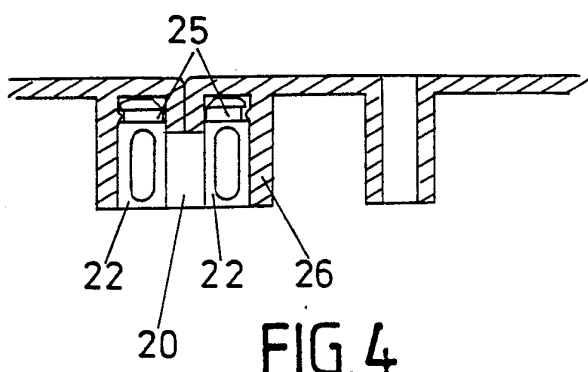


FIG. 4

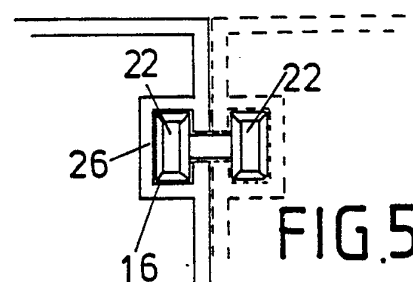


FIG. 5

2/3

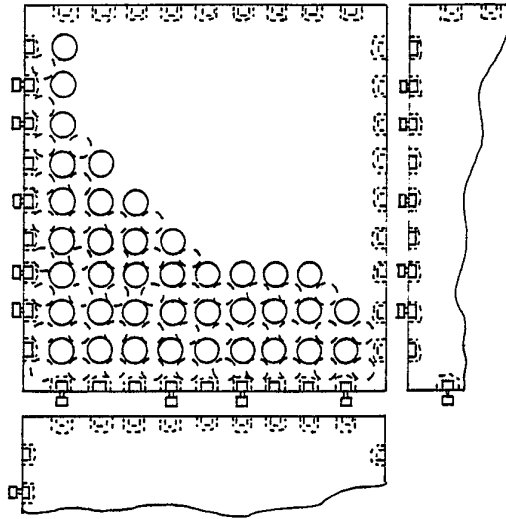


FIG. 6

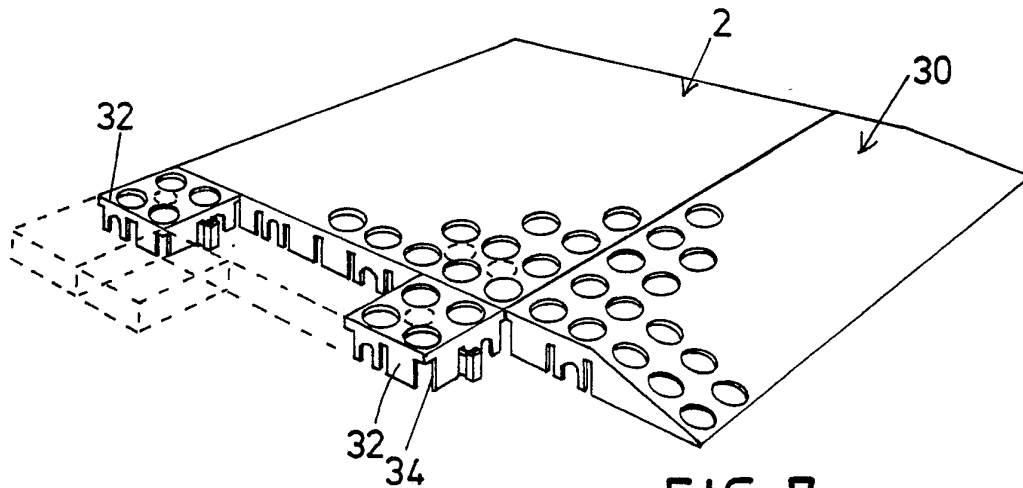


FIG. 7

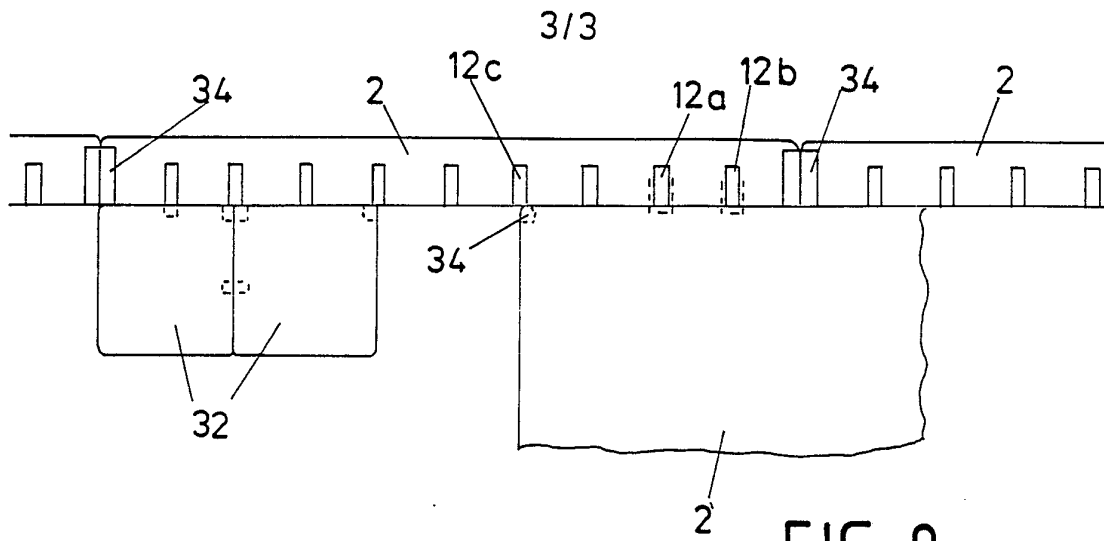


FIG. 8

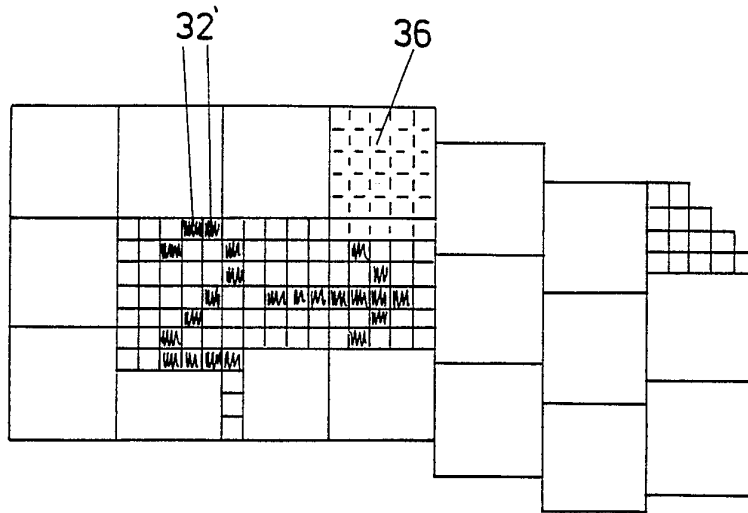


FIG. 9

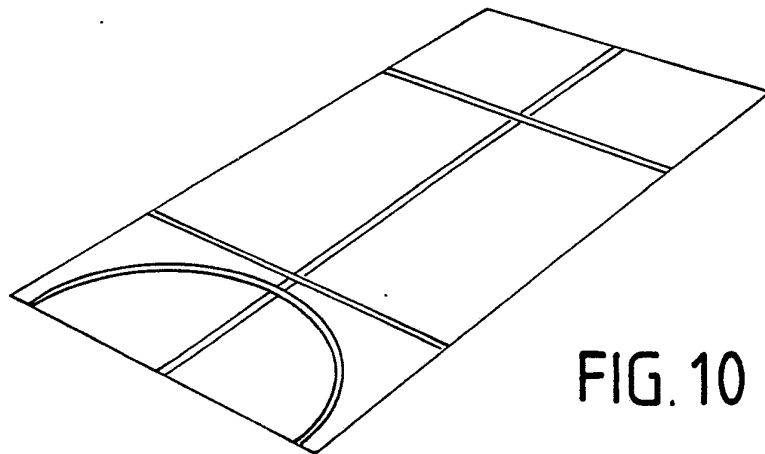
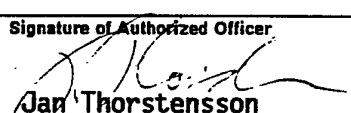


FIG. 10

INTERNATIONAL SEARCH REPORT

International Application No PCT/DK 92/00153

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC5: E 04 F 15/02		
II. FIELDS SEARCHED		
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IPC5	E 04 F; E 04 C; E 04 B; F 16 S	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in Fields Searched ⁸		
SE,DK,FI,NO classes as above		
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹		
Category *	Citation of Document, ¹¹ with Indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	DE, C, 209979 (GEORGE B. STAPLES) 15 May 1909, see page 1, line 40 - page 2, line 9; figures 3,4,8	1,5
Y	--	2-4,6-9
X	US, A, 841998 (L.W. MULFORD) 22 January 1907, see page 1, line 36 - line 64; figures 3,4	1,5
Y	--	2-4,6-9
Y	US, A, 3500606 (M.J. WHARMBY) 17 March 1970, see column 2, line 7 - line 13; column 2, line 27 - line 30; figure 1	2,3
	--	
<p>* Special categories of cited documents:¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
22nd July 1992	1992 -07- 28	
International Searching Authority	Signature of Authorized Officer	
SWEDISH PATENT OFFICE	 Jan Thorstenson	

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
Y	DE, A1, 2812008 (ROTH, LOTHAR) 20 September 1979, see figure 1; claim 8 --	4
Y	EP, A1, 0379717 (OPITZ, DIETER) 1 August 1990, see abstract; figure 4 --	6
Y	EP, A2, 0117707 (MORRISON, RICHARD A.) 5 September 1984, see page 7, line 20 - line 21; abstract; figure 1 --	7,8
Y	US, A, 1028058 (E.B. VON NORDENKAMPF) 28 May 1912, see page 1, line 10 - line 20; figure 1 -- -----	9

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.PCT/DK 92/00153**

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the Swedish Patent Office EDP file on **01/07/92**. The Swedish Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-C- 209979	09-05-15	NONE	
US-A- 841998	07-01-22	NONE	
US-A- 3500606	70-03-17	BE-A- 711198	68-08-23
		FR-A- 1553635	69-01-10
		GB-A- 1212983	70-11-18
		NL-A- 6802610	68-08-26
DE-A1- 2812008	79-09-20	NONE	
EP-A1- 0379717	90-08-01	DE-A- 3902419	90-08-02
EP-A2- 0117707	84-09-05	CA-A- 1191304	85-08-06
		DE-A- 3472887	88-09-01
US-A- 1028058	12-05-28	NONE	