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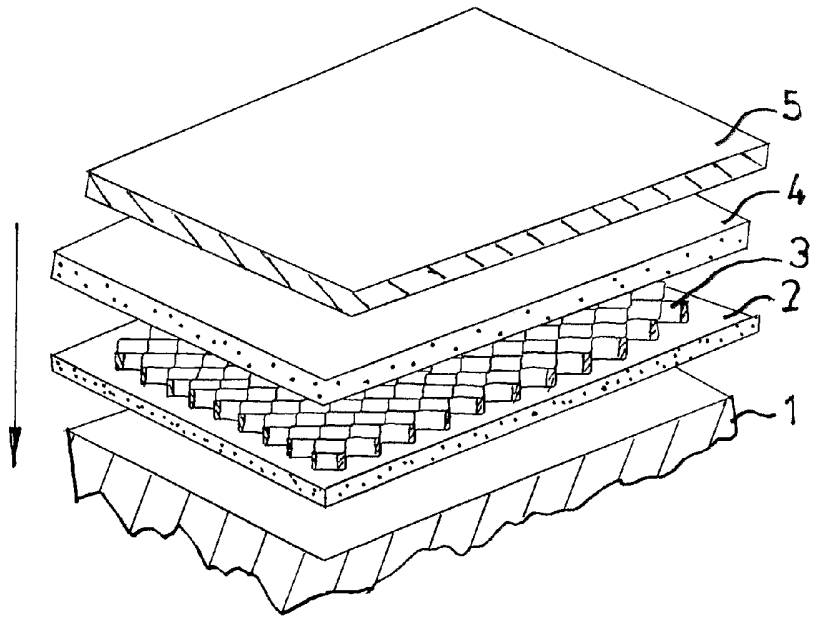
(54) **Title:** METHOD OF MAKING A FLAT FOUNDATION FOR A FLOOR WITHOUT SUBSTANTIAL EXCAVATION AND FOUNDATION MADE BY SAID METHOD



(57) **Abstract:** Cellular foil (3) is unfolded between the surface of earth base course (1) and the first floor layer (5) during building the subsoil, which cellular foil (3) is poured over with fill (4) from loose material at least up to filling the compartments. A bedding (2) from loose material, optimally from sand, is created under the cellular foil (3). Geotextile (6) may be incorporated to the area under the cellular foil (3). Bedding (2) of lower grain size than that of the fill (4) is preferably used, wherein the fill (4) has optimal grain size of 8 to 63 mm. Compaction is done by at least eight travels of roller of 10 to 11 tons weight, also including vibrations when the height of fills is exceeding 25 cm above the cellular foil (3).

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METHOD OF MAKING A FLAT FOUNDATION FOR A FLOOR WITHOUT SUBSTANTIAL EXCAVATION AND FOUNDATION MADE BY SAID METHOD

Technical Field

The technical solution relates to a new method of shallow foundation of floor, particularly for high load bearing floors of buildings such as large-area halls etc. New arrangement of floor subsoil is created using this method.

Background Art

During foundation of industry floors, such system of making-up of subsoil and construction layers of earth plate should be selected, to ensure maximum fulfilment of the floor reliability criteria. Used methods of floor foundation include shallow foundation and deep foundation.

Currently known method of shallow foundation of floor includes creation of classical distributing gravel pad from psephite material such as crushed quarry aggregate, crushed ballast, gravel, gravel sand, and sand. Using this method, surface of earth base course is removed first, often in high volumes, and subsequently made-up grounds of loose materials are performed. Gravel pad created in this way is sometimes reinforced with the help of geotextile or chemical solidification. Subsoil created using these methods consists of pad of loose material, possibly intercalated with geotextile, and of the first floor layer placed on the pad. In case of using the method of chemical solidification, for instance lime stabilisation, chemically solidified layer is additionally contained as an underlayer located on the earth base course. For instance in the case of lime stabilisation, before made-up of gravel pad, solidified layer is created first by the process when the earth layer is mixed with lime, which, after binding water from terrain, will create solidified layer on the basis of calcium carbonate. The first floor layer is then placed directly on this chemically solidified layer or on gravel pad placed on the chemically solidified layer. Disadvantage of these methods include risk of non-uniform load-bearing capacity and uneven settlement of the whole redeveloped area and associated possible problems during cracking of the flooring assembly in

the future. Consequences are manifested as local kneeling or heaving of the floor and cracking of the floor. Other disadvantages of the aforementioned methods include the need to remove material in considerable volumes, necessity to ensure landfills for mucked materials, transportation costs associated with supply of filling materials, and time demands. Other disadvantage when using chemical solidification is the risk of environmentally unfavourable action of chemical preparations, namely lime.

Known method of deep foundation is the method of consolidation with the help of pillars, usually filled with gravel. Using this method includes boring pits of various lengths and diameters into the earth base course, which are subsequently filled with gravel of various grading or with lime. Pillars created in this way are sometimes combined with gravel pad or geotextile. The first floor layer is then placed on the background created in this way. In this case, the subsoil consists of earth base course, pillars of various lengths and widths, optional gravel pad and/or possibly one or several layers of geotextile, and the first floor layer. Other known methods of deep foundation are the methods of solidification with the help of injection, such as Soil-mixing or compaction grouting. In such case, the subsoil consists at least of earth base course, a layer chemically solidified by injection, and the first floor layer. Disadvantages of existing methods of deep foundation are, beside its high demands on mechanization, time and financing, also and particularly the uncertainty of ensuring uniform load-bearing capacity of the floor and even settlement of the floor across the whole redeveloped area.. The consequences are usually, just like in the case of aforementioned methods of floor shallow foundation, cracking of floors in buildings and local sinking or heaving of the floor.

So called cellular foil is known for consolidation of sole of terrains without buildings, such as roads, walkways, pavements, slopes, grass plots, playgrounds etc. Its arrangement is known for instance from patent specifications of US pat. 5,449,543, WO 97/16604 and of CZ PV 1286-98. This cellular foil is created from strips on the basis of plastics that are vertically positioned and interconnected by welding seams or other joints so that a web structure with vertical walls is created, which in a state stretched on a plane contains system of vertically open compartments.

Disclosure of Invention:

The above mentioned disadvantages are eliminated to a considerable extent by the invention. Method of floor shallow foundation is solved, by which the floor subsoil for buildings, halls in particular, is built on modified earth base course, where the floor is shallow founded so that the first floor layer from concrete-based material is laid on modified background. The essence of the invention is that at least one layer of cellular foil in unfolded state is laid down onto the background before laying down the first floor layer, than this cellular foil is overfilled with fill from loose material reaching at least up to the foil height, thus filling the cavities in chambers of the cellular foil, the fill is then compacted and the first floor layer is laid down only now on this compacted fill.

Before laying down the cellular foil, the earth base course is preferably equipped with at least one pad from loose material on the basis of gravel and/or sand, which is then compacted, and thus bedding for cellular foil is created.

Generally, material of finer grading than fill is preferably used as bedding. Sand is the best material for bedding.

During building of floor subsoil, some layer built before placing of the first floor layer can be equipped with geotextile stretched in plane. Exceptionally, the geotextile can be placed in multiple layers.

Quarry stone having sharp edges and grading from dust particle size up to 63 mm, optimally of the grain size 8 to 63 mm, is preferably used as the fill.

The fill mentioned above is compacted, preferably by at least eight travels of roller with mass of 10 to 11 metric tons.

In the case when the fill is created to the height of at least 25 cm above the cellular foil, vibration of travelling roller can be preferably switched on.

New structural arrangement of the floor subsoil is created by the proposed invention. Floor subsoil made by the process according to the invention differs from the existing solutions particularly in that it contains a pad from cellular foil with compartments and from fill between the surface of earth base course and the first floor layer on the basis of concrete . Cellular foil is in a state unfolded to a plane and the fill consists of loose material such as gravel, sand and/or gravel sand

filling compartments of this cellular foil and reaches at least from the lower edge of the cellular foil to at least upper edge of the cellular foil.

At least one layer of bedding of grain size finer than the grain size of the fill is located under the cellular foil and above the surface of the earth base course, preferably considering properties of terrain.

Floor subsoil according to the invention can contain at least one geotextile unfolded in a planar way, preferentially between the first floor layer and the surface of the earth base course. Generally, it is preferential, when the geotextile is located under the cellular foil, i.e. directly under the foil or in some layer under the cellular foil or on some layer located under the cellular foil .

The invention allows creation of subsoil with uniform load-bearing capacity and equal settlement of the subsoil. The subsoil and consequently also the floor are solid, are not sinking locally nor spinning in a plane, edges are not lifting, the floor is not cracking and the whole surface of the floor has the same load-bearing capacity. The invention is utilizable particularly for industrial floors, factory buildings and halls with high load bearing floor such as freezing plants, supermarkets, garages etc. It can replace the existing methods of floor foundation, both methods of shallow foundation and methods of deep foundation as well. It can be also combined with the methods mentioned above, as the case may be. It can eliminate the necessity to build pillars and/or remove large volumes of earth base course. The subsoil can be created quickly and without demanding modifications or substantial interference with background from earth base course.

Review of figures on drawings

The invention is illustrated using drawings, where Fig. 1 shows representative subsoil according to the example 1, consisting of earth base course, bedding, cellular foil, fill and lower floor layer, Fig. 2 shows process of placing layers one to another according to the invention during making subsoil illustrated on the previous figure, Fig. 3 shows representative subsoil according to the example 2, consisting of earth base course, geotextile, bedding, cellular foil, fill and lower floor layer, Fig. 4 shows process of placing layers one to another according to the invention during making subsoil illustrated on the previous figure, Fig. 5 shows

spatial arrangement of subsoil according to the example 2, Fig. 6 shows spatial arrangement of subsoil according to the example 1, Figs. 7 to 9 show other variants of subsoil made by the procedure according to the invention .

Examples of Embodiment of Invention

Example 1

Example of embodiment of the invention is the procedure of making the subsoil according to Fig. 2 and the subsoil for freezing store according to Figs. 1 and 6 made by the procedure.

Drainage bedding 2 of broken quarry gravel aggregate with particle size of 32 to 63 mm has been brought to the surface of earth base course 1 evened to horizontal level. Bedding 2 has been levelled and compacted by 10 travels of roller weighing 10 metric tons with vibration. Compacted bedding 2 reached the height of 25 cm. Twenty cm high cellular foil 3 has been placed on the surface of this background and stretched in a plane so that it covers all the area designed for the building. Then, the fill 4 from quarry gravel aggregate with grain size of 32 to 63 mm has been gradually brought to the cellular foil 3. The aforesaid fill 4 has been dumped and a spread over the cellular foil 3 until it filled its compartments and reached the height of approx. 10 cm over the top edge of the cellular foil 3. The fill has been compacted with 12 travels of roller. Then, dumping of next 10 cm of fill 4 continued, this time from quarry gravel aggregate with grain size of 0 to 63 mm. Then, when the fill 4 reached 20 cm over the cellular foil, its compaction has been performed by twenty travels of roller weighing 10 metric tons, after which next 10 cm of the same material has been brought and compacted by twelve travels of the same roller using vibrations. Then, the overall height of the fill 4 reached 50 cm, and the cellular foil 3 has been incorporated in its lower part. The first floor layer 5 in the form of steel-fibre-reinforced concrete has been laid down onto such treated background. The floor, not shown on drawings, has been made on this subsoil, where next layers has been made in a common way, laying down heat insulation and reinforced concrete with tubular heating. The subsoil has been used for foundation of floor in a freezing plant.

The subsoil made by the aforesaid process contained, listed from the bottom to the top, earth base course 1, 25 cm high bedding 2, a pad on it from fill 4 and cellular foil 3, where the fill 4 was 50 cm high in total, and the aforesaid 20 cm high cellular foil 3 has been incorporated in its lower part, and the first floor layer 5 has been contained on this pad. Static load tests proved that the values of deformation modulus considerably exceeded stated requirements. The subsoil has been evaluated as a homogenous one with minimal differences in quality within the framework of the building. Values of the subsoil quality requirements has been considerably exceeded.

Example 2

Other, in the inventor's opinion the optimal example of embodiment of the invention is the process of making the subsoil according to the Fig. 4 and the subsoil for metal works hall according to Figs. 3 and 5 made by the procedure .

Geotextile 6 of approximately 2 mm height has been placed on the surface of earth base course 1 evened to horizontal level by mucking the arable layer and plow pan. Drainage bedding 2 from sand with particle size of 0.63 to 2 mm has been brought on it. Bedding 2 has been levelled and compacted by 10 travels of roller weighing 11 metric tons. Compacted bedding 2 reached to the height of10 cm. Fifteen cm high cellular foil 3 has been placed on the surface of this background and stretched in a plane so that it covers all the area designed for the building. Then, the fill 4 from quarry gravel aggregate with grain size of 8 to 63 mm has been gradually brought to the cellular foil 3. The aforesaid fill 4 has been dumped and a spread over the cellular foil 3 until it filled its compartments and reached the height of approx. 10 cm over the top plane of the cellular foil 3. The fill has been compacted with 12 travels of roller weighing 11 metric tons. Then, dumping and a spreading of the fill 4 continued. Later, when the fill 4 reached approximately 20 cm over the cellular foil 3, its compaction has been performed by eight travels of roller weighing 11 metric tons, after which next 10 cm of the same material has been brought. Then the surface has been compacted by ten travels of the same roller using vibrations. After compaction, the overall height of the fill 4 reached 45 cm, and the cellular foil 3 has been incorporated in its lower part. The

first floor layer 5 in the form of concrete has been laid down onto background treated in this way. In this way, subsoil has been created on which the floor, not shown on drawings, has been made, where next layers has been made in a common way, laying down concrete, heat insulation and tile flooring, and a building of metal works has been raised.

This subsoil contained, listed from the bottom to the top, earth base course 1, approximately 2 mm high geotextile 6, 10 cm high bedding 2, a pad on it from cellular foil 3 and fill 4, where the fill 4 was 45 cm high in total, and the aforesaid 15 cm high cellular foil 3 has been incorporated in its lower part, and the first floor layer 5 has been situated on this pad.

Uniform load-bearing capacity of the floor and uniform settlement of the floor has been achieved.

Example 3

Embodiment of the invention has numerous variants, consistent in possible omitting of bedding 2 and omitting of geotextile 6, or incorporation of geotextile 6 in arbitrary height during creation of subsoil. The most frequent examples of these alternatives in the framework of the invention are illustrated on Figs. 7 to 9.

Fig. 7 shows the subsoil created on earth base course 1, and containing only pad from cellular foil 3 and fill 4, and the first floor layer 5 placed on it.

Fig. Fig. 8 shows the subsoil created on earth base course 1, and containing geotextile 6, next the pad from cellular foil 3 and fill 4, and the first floor layer 5 placed on it.

Fig. 9 shows the subsoil created on earth base course 1, and containing bedding 2 on which resides geotextile 6, next the pad from cellular foil 3 and fill 4, and the first floor layer 5 placed on it. The abovementioned examples of embodiment only demonstrate options of embodiment of the invention, without limiting them, geotextile 6 can be for instance incorporated as intermediate layer inside the bedding 2 or the fill 4.

CLAIMS

1. Method of floor shallow foundation in which the floor subsoil for buildings, particularly halls and assembly shops, is built on made-up earth base course (1), when the floor is shallow founded in that way that the first floor layer (5) from concrete-based material is laid on modified background, **characterized by that** at least one layer of cellular foil (3) in unfolded state is laid down onto the background before laying down the first floor layer (5), than this cellular foil (3) is overfilled with fill (4) from loose material reaching at least up to the height of the cellular foil (3), thus filling the cavities in its chambers, the fill (4) is compacted and the first floor layer (5) is laid down only now onto this compacted fill (4).

2. Method of floor shallow foundation according to the claim 1, **characterized by that** before laying down the cellular foil (3), the earth base course (1) is equipped with at least one pad from loose material on the basis of gravel and/or sand, which is then compacted, and thus bedding (2) for cellular foil (3) is created.

3. Method of floor shallow foundation according to the claim 2, **characterized by that** bedding (2) of grain size finer than the fill (4) is used, preferentially sand.

4. Method of floor shallow foundation according to the claims 1 to 3, **characterized by that** during building the floor subsoil, some layer, preferentially the one under the cellular foil (3), is equipped with at least one layer of geotextile (6) before laying down the first floor layer (5).

5. Method of floor shallow foundation according to claims 1 to 4, **characterized by that** quarry stone of the grain size 8 to 63 mm is used as the fill (4).

6. Method of floor shallow foundation according to the claims 1 to 5, **characterized by that** the fill (4) is compacted by at least eight travels of roller of 10 to 11 metric tons weight.

7. Method of floor shallow foundation according to the claims 1 to 6, **characterized by that** the fill (4) is created up to the height of at least 25 cm above the cellular foil (3) and then compacted by travels of roller using vibrations.

8. Floor subsoil made by the method according to some of the claims 1 to 7, **characterized by that** it contains a pad from cellular foil (3) with compartments and from the fill (4) between the surface of earth base course (1) and the first floor layer (5) based on concrete, where the cellular foil (3) is in the planar unfolded state and the fill (4) consists of loose material filling the compartments of this cellular foil (3) and reaches at least from the lower edge of the cellular foil (3) at least up to its upper edge.

9. Floor subsoil according to claim 8, **characterized by that** at least one layer of bedding (2) of grain size finer than the fill (4) grain size is located under the cellular foil (3), above the surface of the earth base course (1).

10. Floor subsoil according to claims 8 and 9, **characterized by that** at least one planar unfolded geotextile (6) is located between the first floor layer (5) and the surface of the earth base course (1), preferentially under the cellular foil (3).

Fig. 1

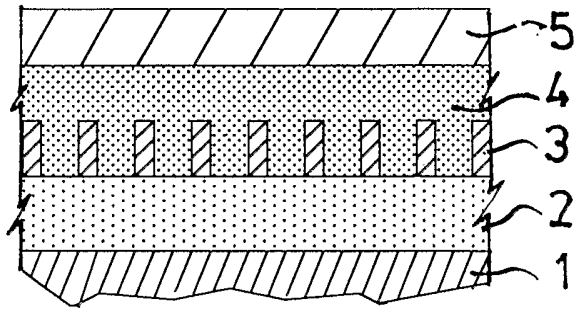


Fig. 2

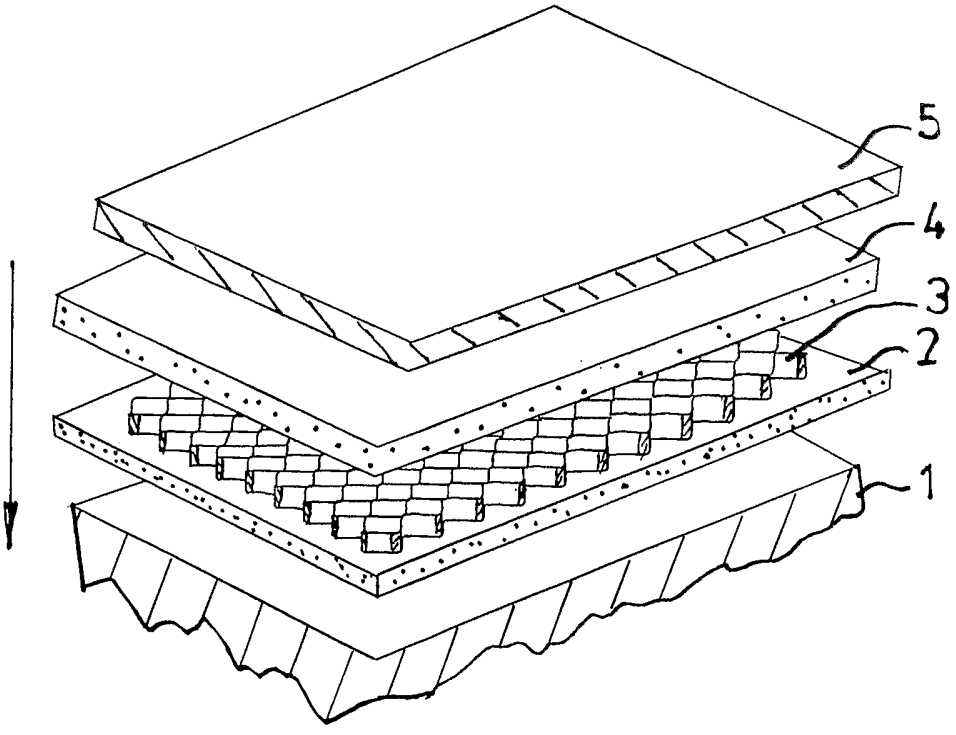


Fig.3

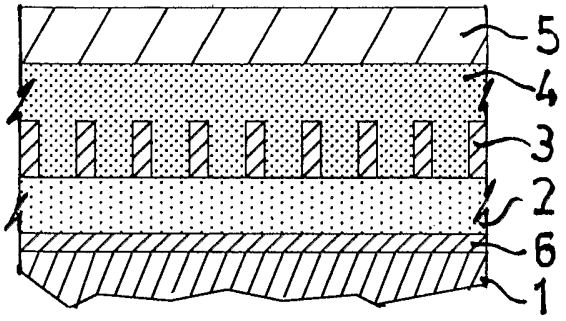


Fig.4

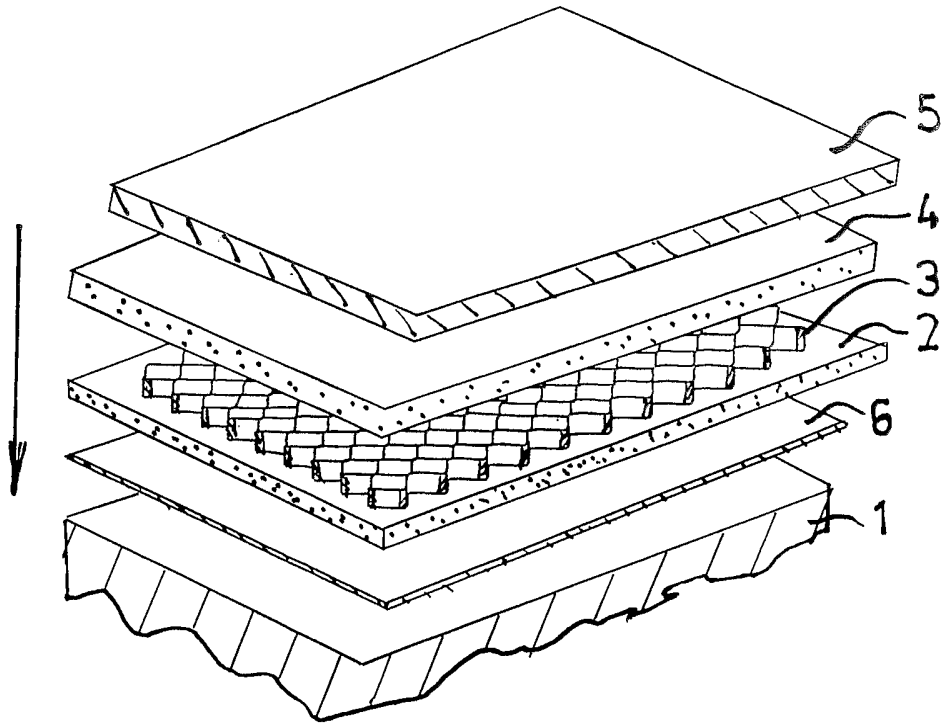


Fig.5

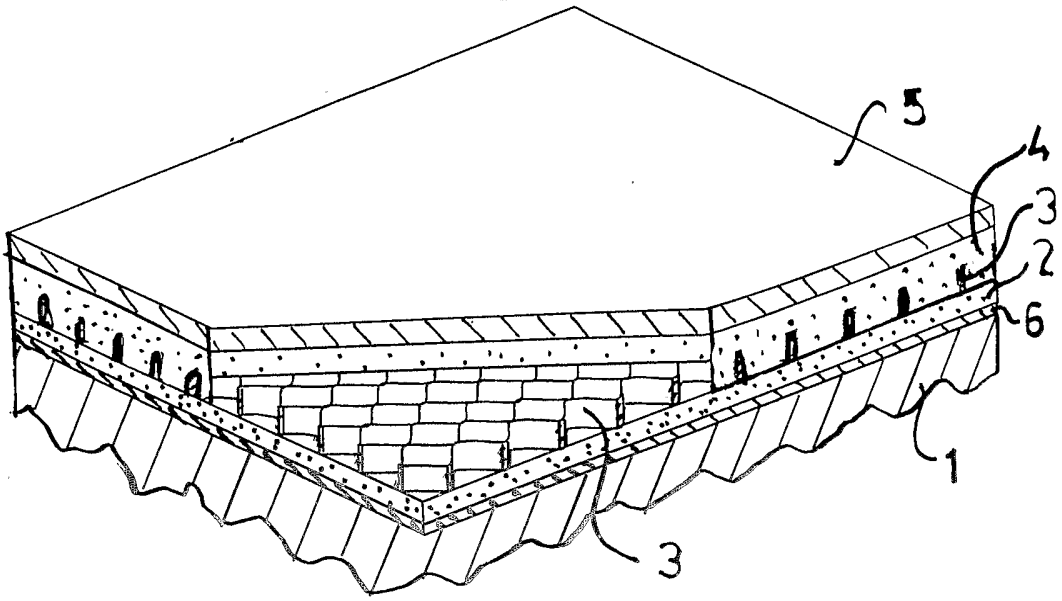


Fig.6

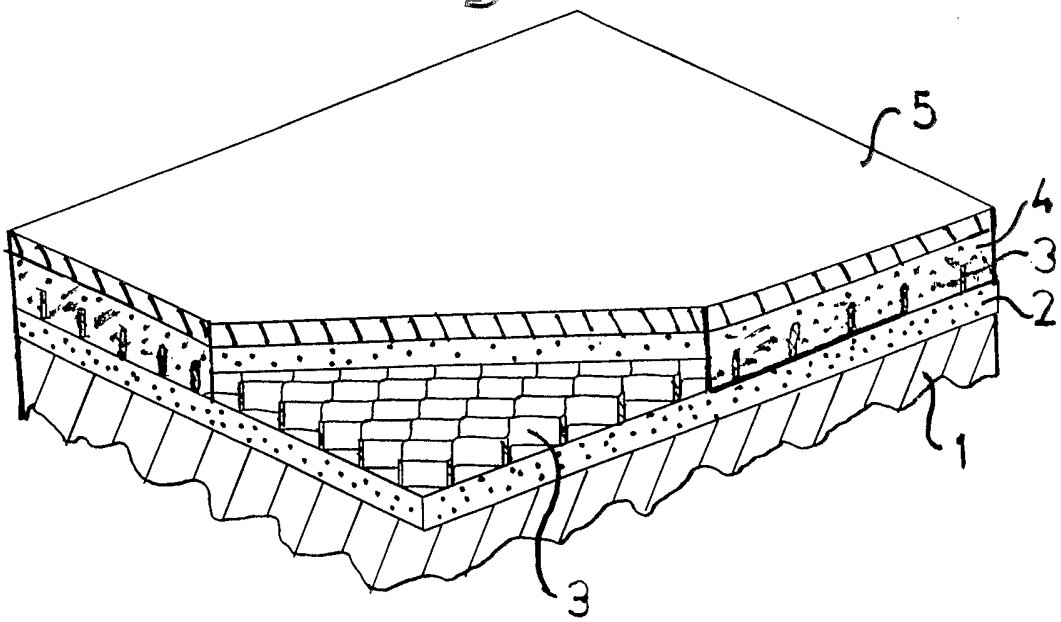


Fig. 7

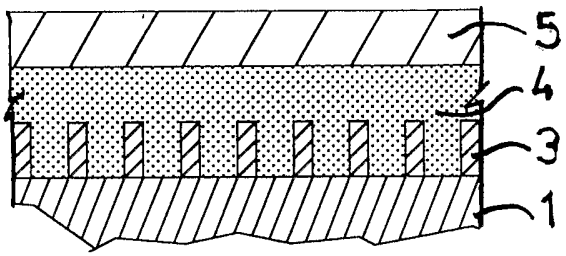


Fig. 8

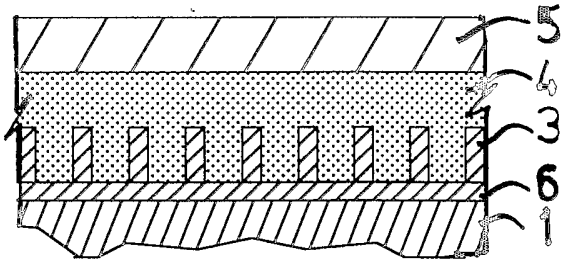
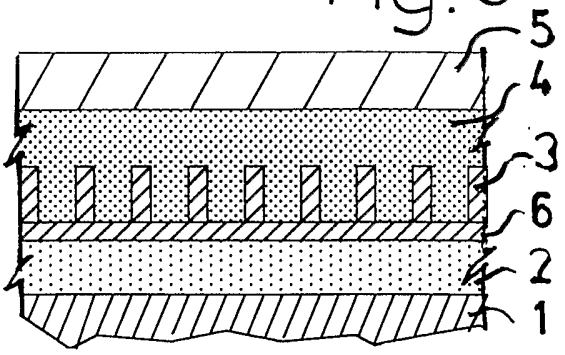


Fig. 9



INTERNATIONAL SEARCH REPORT

International Application No
PCT/CZ 03/00051

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 E02D27/01 E02D27/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 E02D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 378 310 A (REYNOLDS CONSUMER PROD) 18 July 1990 (1990-07-18)	8
A	column 1, line 36 -column 7, line 3; figures 2-6	1-7,9,10
X	US 6 296 924 B1 (BACH GARY M) 2 October 2001 (2001-10-02)	8
A	column 2, line 6 -column 7, line 8; figures 1,3	1-7,9,10
A	US 6 484 473 B1 (HALL ALETHEA ROSALIND MELANIE) 26 November 2002 (2002-11-26)	1-10
X	column 1, line 42 -column 6, line 57; figure 1	8
A	GB 1 058 611 A (EDISON SOC) 15 February 1967 (1967-02-15) the whole document	1-10

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
3 February 2004	13/02/2004

Name and mailing address of the ISA	Authorized officer
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INTERNATIONAL SEARCH REPORT

International Application No
PCT/CZ 03/00051

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 285 378 A (PRESTO PRODUCTS INC) 5 October 1988 (1988-10-05) the whole document ---	1-7,9,10
A	EP 0 378 309 A (REYNOLDS CONSUMER PROD) 18 July 1990 (1990-07-18) column 2, line 16 -column 6, line 49; figure 2 -----	1,8

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/CZ 03/00051

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
EP 0378310 A	18-07-1990	US	4965097 A	23-10-1990
		AT	90753 T	15-07-1993
		CA	1336802 C	29-08-1995
		DE	69001906 D1	22-07-1993
		DE	69001906 T2	07-10-1993
		DK	378310 T3	12-07-1993
		EP	0378310 A1	18-07-1990
		ES	2043262 T3	16-12-1993
		IE	61633 B1	16-11-1994
		JP	2229304 A	12-09-1990
		JP	2825897 B2	18-11-1998
		MX	174402 B	13-05-1994
US 6296924 B1	02-10-2001	AT	240437 T	15-05-2003
		AU	716485 B2	24-02-2000
		AU	7603696 A	22-05-1997
		BR	9611496 A	28-12-1999
		CA	2236037 A1	09-05-1997
		CN	1201499 A ,B	09-12-1998
		CZ	9801286 A3	17-03-1999
		DE	69628182 D1	18-06-2003
		DK	858534 T3	15-09-2003
		EP	0858534 A1	19-08-1998
		HU	9902090 A2	28-10-1999
		IL	124269 A	19-03-2001
		JP	2000500406 T	18-01-2000
		NO	981988 A	30-06-1998
		PL	326559 A1	28-09-1998
		PT	858534 T	30-09-2003
		RU	2196864 C2	20-01-2003
		SK	53198 A3	11-02-1999
		TR	9800781 T2	21-07-1998
		WO	9716604 A1	09-05-1997
		US	6395372 B1	28-05-2002
		ZA	9609160 A	02-06-1997
US 6484473 B1	26-11-2002	AU	754055 B2	31-10-2002
		AU	3726199 A	20-12-1999
		CA	2333952 A1	09-12-1999
		EP	1084306 A1	21-03-2001
		AT	238461 T	15-05-2003
		AU	746560 B2	02-05-2002
		AU	3841199 A	20-12-1999
		AU	752113 B2	05-09-2002
		AU	4159299 A	20-12-1999
		CA	2333738 A1	09-12-1999
		CA	2333950 A1	09-12-1999
		DE	69907177 D1	28-05-2003
		DE	69907177 T2	08-01-2004
		EP	1084307 A1	21-03-2001
		EP	1082499 A1	14-03-2001
		WO	9963165 A1	09-12-1999
		WO	9963166 A1	09-12-1999
		WO	9963167 A1	09-12-1999
		US	6599611 B1	29-07-2003
		US	6554545 B1	29-04-2003
		ZA	200007067 A	05-06-2001
		ZA	200007068 A	21-11-2001

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/CZ 03/00051

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6484473 B1		ZA 200007069 A	07-06-2001
GB 1058611 A	15-02-1967	NONE	
EP 0285378 A	05-10-1988	US 4778309 A	18-10-1988
		AT 61829 T	15-04-1991
		CA 1295137 C	04-02-1992
		DE 3862051 D1	25-04-1991
		EP 0285378 A1	05-10-1988
		GR 3001683 T3	23-11-1992
		IE 60854 B1	24-08-1994
		MX 166343 B	30-12-1992
EP 0378309 A	18-07-1990	EP 0378309 A1	18-07-1990
		JP 2229303 A	12-09-1990