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(72) Inventors:
• **ANTONOV, Yury Viktorovich**
Tula, 300045 (RU)
• **ZOLOTOV, Igor Alekseevich**
Tula, 300012 (RU)

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(74) Representative: **Jeck, Anton**
Jeck, Fleck & Partner mbB
Patentanwälte
Klingengasse 2
71665 Vaihingen/Enz (DE)

(71) Applicant: **Obschestvo s Ogranichennoy**
Otvetstvennostiu "Shar"
Ul. Administrativnaya, d. 20 (RU)

(54) **BUILDING BLOCK FOR CONSTRUCTION SET**

(57) The invention relates to construction toys, is light-weight, low in material content, highly manufacturable, and requires less space for storage and transportation. The present building block for a construction set is made of molded paper pulp in the form of a parallelepiped and consists of two separate hollow-bodied elements, the first of which comprises a face having at least four protuberances, and side walls, and the second of which has at least one protuberance; the two block elements are capable of being joined together by fitting the second element between the side walls of the first element, and one of said block elements comprises at least one limiting well.

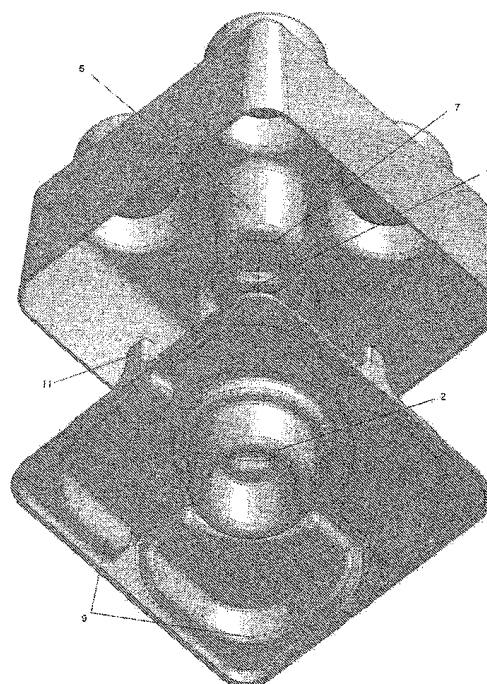


Fig. 3

Description

Technical sphere

[0001] An invention refers to tinker-toys, containing assembly elements with connecting means for demountable assembly of assembly elements.

Prior art

[0002] The technical result is the ability to reduce weight and volume of the construction toy detail.

[0003] Parallelepipedal construction toy detail consists of two separate hollow elements. The first element contains at least four protrusions on one of the faces and at least one protrusion located on the opposite face, as well as side walls, and a second element contains at least one protrusion. Both elements of the detail are designed for their interconnection by tightly fitting the second element between the side walls of the first element, and one of these elements of the detail contains at least one limit well for bracing in the corresponding supporting platform of the other element, while both elements of the detail are made of molded paper pulp.

[0004] A utility model refers to tinker-toys, containing assembly elements with connecting means for demountable assembly of assembly elements.

[0005] The closest in technical substance, i.e. the prototype, is a building block designed as a rectangular parallelepiped, containing the lower and four side walls, at least four cylindrical protrusions extending outward from the bottom and arranged in two lines of opposite protrusions defining a square, tubular protrusion parallel to the side walls on the inner surface of the bottom, the longitudinal axis of the tubular protrusion passes through the center of the square with the possibility of contact with the specified cylindrical protrusions of another block, with the specified tubular protrusion and at least one side wall when indicated peripheries are geometrically projected onto the bottom, whereby the cylindrical protrusions on one of these blocks can be inserted into the clamping engagement with the tubular protrusion and the wall of the other of the indicated blocks, while the inner diameter of the tubular protrusion equals to the diameter of these cylindrical protrusions. (Ref. US 3005282 A).

[0006] The known solution can be used as a tinker-toy, which is a set of blocks - particular bricks of which various structures can be built, however, it has the following disadvantages.

[0007] The block is made as a single monolithic element and with small block size its weight is also small. However, with a size gain of the blocks, their reliable connection with each other will require a proportional increase in the thickness of the side walls and the bottom thickness, comparable with the diameters of the tubular and cylindrical protrusions. With block sizes comparable, for example, to the dimensions of a brick or book, its weight, even if made of plastic, becomes unacceptable

for the safe construction of complex structures. Such heavy blocks cannot be used as toys, especially children's toys as they are unsafe. For the same reason the known solution is problematic and in some cases impossible to use when creating decorations, large art objects and other similar structures.

[0008] The indicated drawback confines the scope of use of the known solution.

[0009] Another drawback is the excessively large volume required for storage and transportation of the construction toy, containing many blocks. In particular, this drawback is relevant for large blocks. This disadvantage brings inconvenience in storing and transporting of large number of blocks.

[0010] The drawbacks also include high material consumption and the complexity in manufacturing monolithic blocks, reducing their manufacturability.

Technical problem

[0011] The technical result is to expand the area of application due to the possibility of reducing the weight of the construction toy detail, providing the possibility to reduce the required volume for storage and transportation of the construction toy details, reducing material consumption and increasing manufacturability.

Summary of Invention

[0012] The specified result is achieved by the fact that the construction toy detail, made in the form of a parallelepiped and containing at least four protrusions, forming an imaginary square and arranged in two lines, on one of the faces and at least one protrusion located on the opposite face, along the axis of the specified square, while the indicated block consists of two separate hollow elements, the first containing a face with at least four specified protrusions, as well as side walls, and the second element with at least one specified protrusion, both elements of the construction toy block are made with the possibility of their interconnection by placing the second element between the side walls of the first element, and one of these elements contains at least one limit well for bracing in the corresponding supporting platform of the other element, both elements are made of molded paper pulp.

[0013] In addition, - four side faces of the block are made flat;

- the dimensions of the protrusions on opposite faces of the block and their position relative to the side walls are made coordinated, providing center-to-center connection of adjacent blocks, as well as connection of adjacent blocks with an off-center relative to the axial line of the block;
- the shape of the limit well for bracing in the corresponding supporting platform and the shape of the

supporting platform of another element is made coordinated in shape for inter-fixation of the positions in the assembled block;

- the second element has a bend to the outside of the perimeter edge to brace against it the edges of the side walls of the first element in the assembled block;
- the planes of the side sections of the elements are made with a lean relative to the center line;
- every four protrusions located on one of the faces, form an imaginary square, and the protrusion on the opposite side of the block is located on the axis of the indicated square.

Brief description of drawings

[0014] Building block is illustrated using the drawings, where Fig. 1 shows a general view of a first element of a building block; Fig. 2 is a general view of the second element of the building block, Fig. 3 is a general bottom view of the elements of the construction toy detail, Fig. 4 is a schematic sectional view of an assembled building block along a profile plane passing through the center line of an imaginary square; Fig. 5 is an example of an object assembled from building block in the form of a house; Fig. 6 is an example of an object assembled from building block in the form of a rack.

[0015] The following legend is in the drawing:

1 - protrusion made on the first element, 2 - protrusion made on the second element, 3 - imaginary square, 4 - center line of imaginary square, 5 - limit well, 6 - supporting platform, 7 - limit well bottom, 8 - sidewalls angle, 9 - textured protrusions of the second element forming inner surfaces of sidewalls, 10 - edging of the second element, 11 -stiffener.

Description of embodiment

[0016] Building block is made of molded paper pulp in the form of a hollow spacious structure as a parallelepiped with a rectangular base and consists of two elements. The first element of the block contains a face with at least four protrusions and side walls. Indicated protrusions are external and are arranged in two lines, at the corners of an imaginary square. The second element contains the opposite face with at least one external protrusion on it, which is also external and oriented along the axis of the specified square. Both of these elements of the block are made with the possibility of their interconnection, so that in the assembled block a part of the second element was inside the space of the first element engaged with its side walls

[0017] One of the indicated elements contains at least one limit well, located, for example, along the axis of the specified imaginary square, but directed inward to the block, i.e. towards another element and performing the

function of supporting one element on another element. In this case, the other element is provided with an appropriate supporting platform for bracing in the specified limit well in the assembled block. The supporting platform is made textured, the texture profile of which is consistent with the profile of the limit well bottom. The textured surface may be a square indentation at the bottom of the limit well and a corresponding square profile on the supporting platform of another element. At the same time, two elements in the assembled block touch each other with their perimeters and the places of interaction of the limit wells with supporting platforms, of which there may be several. Such a connection of the two elements provides inter-fixation of the positions of the first and second elements in the assembled block eliminating the possibility of their relative displacement or rotation.

[0018] External protrusions on opposite faces of the block can be executed in various sections: round, square, star-shaped and others, satisfying the requirement of reliable connection of mating adjacent construction block when building structures.

[0019] The side faces of the block, as well as the planes of the side surfaces of protrusions and wells of the block are made with an inclination relative to the center line, which ensures ease of manufacture and, as a result, an increase in the block manufacturability.

[0020] The size of the protrusions of the block and the distance between these protrusions and the side walls are made with the possibility of ensuring the connection of adjacent blocks by installing the blocks on top of each other. In this case, the protrusions of the lower block are led into the indentations between the corresponding protrusions of the upper block for center-to-center connection of the block, or between the protrusions and the inner side wall of the upper block when connected out of alignment.

[0021] The inner side walls of the block are formed due to the texture of the second element, which also provides the function of stiffeners that increase the rigidity of the block.

[0022] Around the perimeter of the second element edge the outward bend is made to brace the edge of the side walls of the first element.

[0023] The height of the external elements corresponds to the depth of the indentations between the protrusion and the side walls of the second element, so that during assembly the adjacent blocks abut against each other with the corresponding surfaces.

[0024] The number of protrusions of the first element may be more than 4, for example, 4, 6, 8, etc. In case of 6 protrusions, we have two imaginary squares, since it is formed with only four protrusions arranged in two lines. In case of 8 protrusions we have three imaginary squares with their corresponding axial lines. In this case, the number of protrusions of the second element will be, respectively, 1, 2, 3, etc.

[0025] Building block is used as follows.

[0026] Storage and transportation of block' elements

are carried out separately. Moreover, due to the inclination of the side profiles of walls and the fact that the elements are hollow and the protrusion on one side corresponds to an indentation on the back side of the corresponding element of the block, these elements can be coaxially inserted into one another during storage. Storage and transportation of block' elements separately, in an inserted state, saves about 75% of space compared with storing blocks assembled.

[0027] Two block's elements made of molded paper pulp are piece together so that the lower edge of the side walls of the first element abuts against the edging of the second element, and the supporting platform abuts against the corresponding area of the limit well. The textured execution of the supporting platform additionally stabilizes the position of two elements of the detail, providing stiffness.

[0028] Assembled construction of the block is sufficiently rigid, which is ensured, also, due to the inter-spacing of the planes fixing the position of the side walls from each other. The value of the specified spacing is determined by the height of the limit well. The position of the side walls in the upper part determines the integrity of the first element, and the fixation of their position in the lower part determines the second element with its textured execution.

[0029] The connection of the two elements of the block is ensured by the density of the installation of the second element inside the side walls of the first element, so that the second element is covered by the side walls of the first element. In the cases where a more rigid connection is required, both elements of the block can be fastened by gluing along the perimeter and at the contact points of the elements through the supporting platforms. The block assembled and glued in this way becomes non-assembled block.

[0030] The dimensions of the protrusions, as well as the dimensions of the indentations between them and the position of the protrusions relative to the side walls provide an easy and reliable connection of adjacent details when creating improvised designs.

[0031] Details can be connected not only coaxially when the protrusions of one detail are installed between the cylindrical protrusions of an adjacent detail, but also off-center, when some of the protrusions can be used to connect to one adjacent detail, and part can be used to connect to another detail, which allows you to create a wide variety of constructions.

[0032] Due to the hollow design of the block, its weight is insignificantly dependent on the size of the block, which makes it possible to manufacture and use both small bricks of the construction toy and lightweight large blocks.

[0033] Building blocks ensure safety in use even when using large blocks of the building bricks' size and above. Therefore, high safety in use allows using building blocks also as toys for children.

[0034] Building block can be used to create decorations, single-action art objects, large structures for public

gatherings and celebrations, etc., which provides a wide implications of the solution.

[0035] The composite design of the block also provides a reduction in material costs during manufacture of block. In addition, the molding of paper pulp is easier from a technological point of view than the casting of large monolithic blocks, which improves the manufacturability of blocks.

[0036] The manufacturing process of building blocks is also more environmentally friendly compared to casting of monolithic plastic blocks.

[0037] Therefore, the building blocks require less volume during their storage and transportation, reduce material consumption and increase manufacturability.

[0038] Moreover, building blocks are safe for use as children's toys even with large sizes of blocks, and the manufacturing process of construction toy details provides high environmental security.

Industrial applicability

[0039] Building blocks can be made from molded paper obtained from waste paper by casting.

Patent literature

[0040] Patent literature: US 3005282 A

Claims

1. Building block is made in the form of a parallelepiped and contains at least four protrusion located in two lines, on one of the faces, and at least one protrusion located on the opposite side, **characterized in that** the said block consists of two separate hollow elements, the first containing a face with at least four specified protrusions, as well as side walls, and the second element with at least one specified protrusion, both elements of the block are made with the possibility of their interconnection by placing the second element between the side walls of the first element, and one of the specified elements of the block contains at least one limit well for bracing in the corresponding supporting platform of the other element, while both elements of the block are made of molded paper pulp.
2. Building block as per item 1, **characterized in that** the side faces of the block are made flat.
3. Building block as per item 1, **characterized in that** the dimensions of the protrusions on opposite sides of the block and their position relative to the side walls are made consistent, providing center-to-center connection of adjacent block, as well as connecting adjacent block with an offset relative to the center line of the block.

4. Building block as per item 1, **characterized in that** the shape of the limit well for bracing in the corresponding supporting platform and the shape of the supporting platform of another element are made consistent in shape for inter-fixation of positions in the assembled block. 5
5. Building block as per item 1, **characterized in that** the second element has an outward bend of the perimeter edge to abut against it the edges of the side walls of the first element in the assembled block. 10
6. Building block as per item 1, **characterized in that** the planes of the side profiles of the elements are made with an inclination relative to the center line. 15

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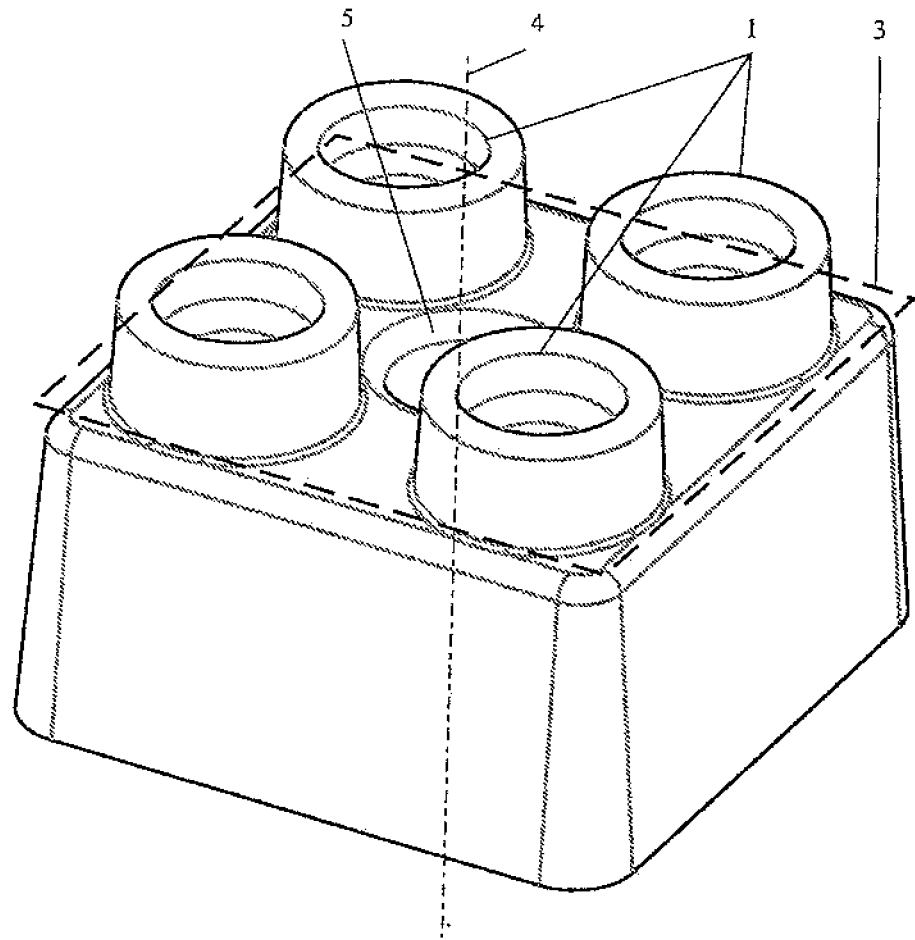


Fig. 1

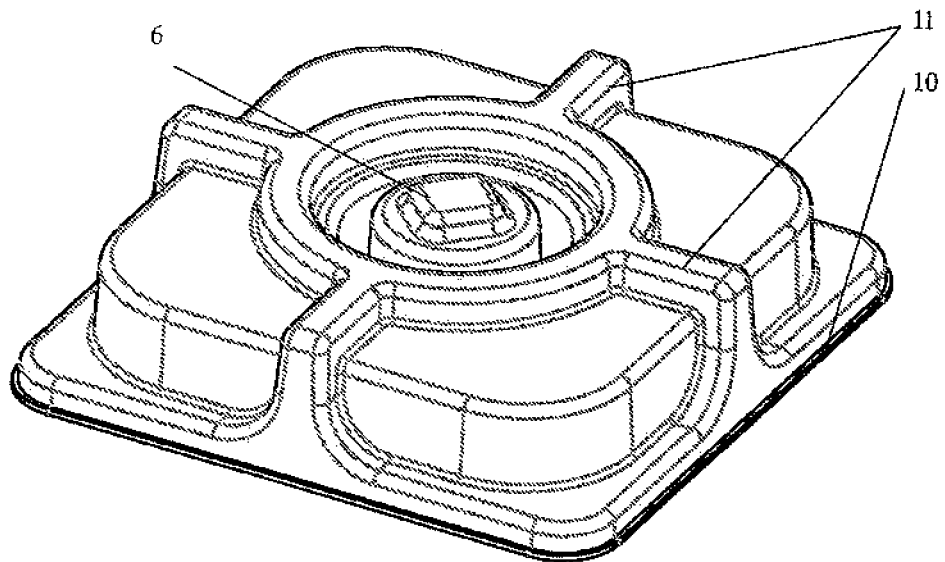


Fig. 2

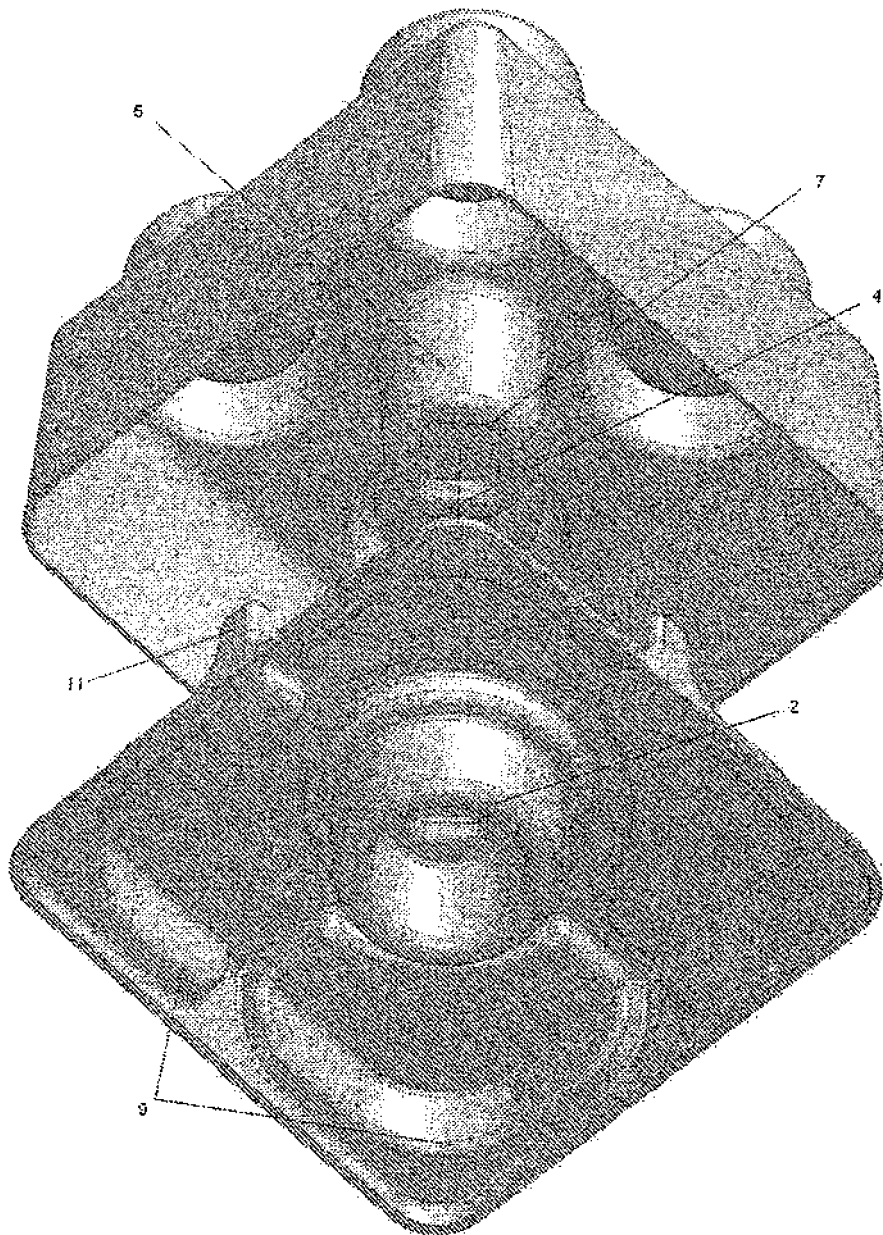


Fig. 3

Fig. 4

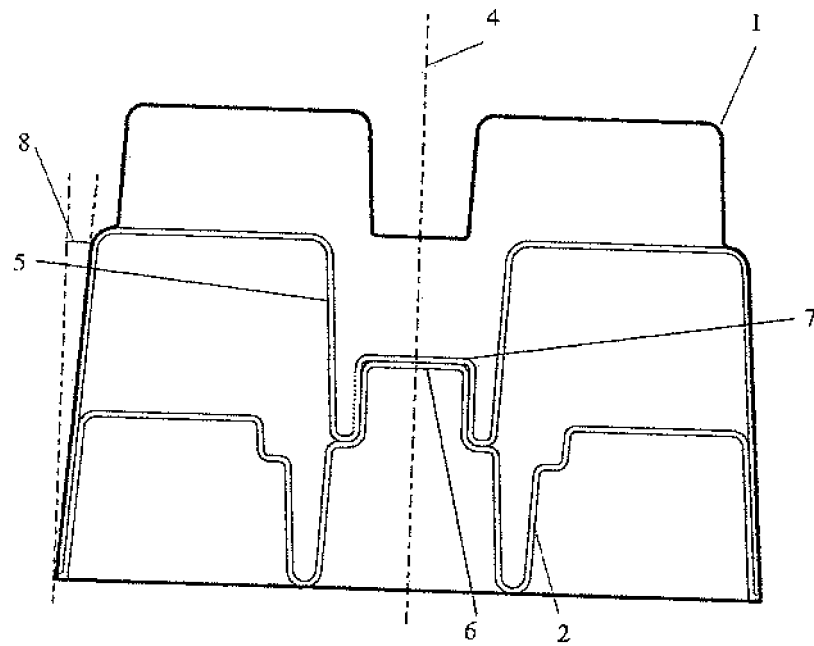


Fig. 5

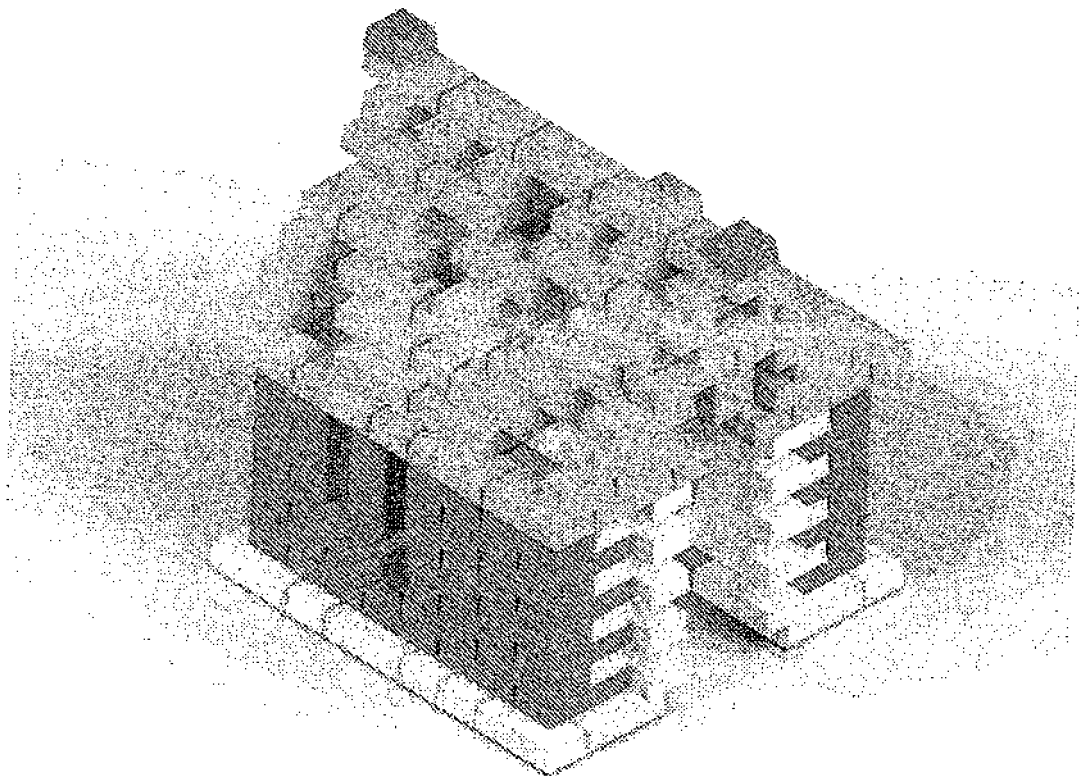
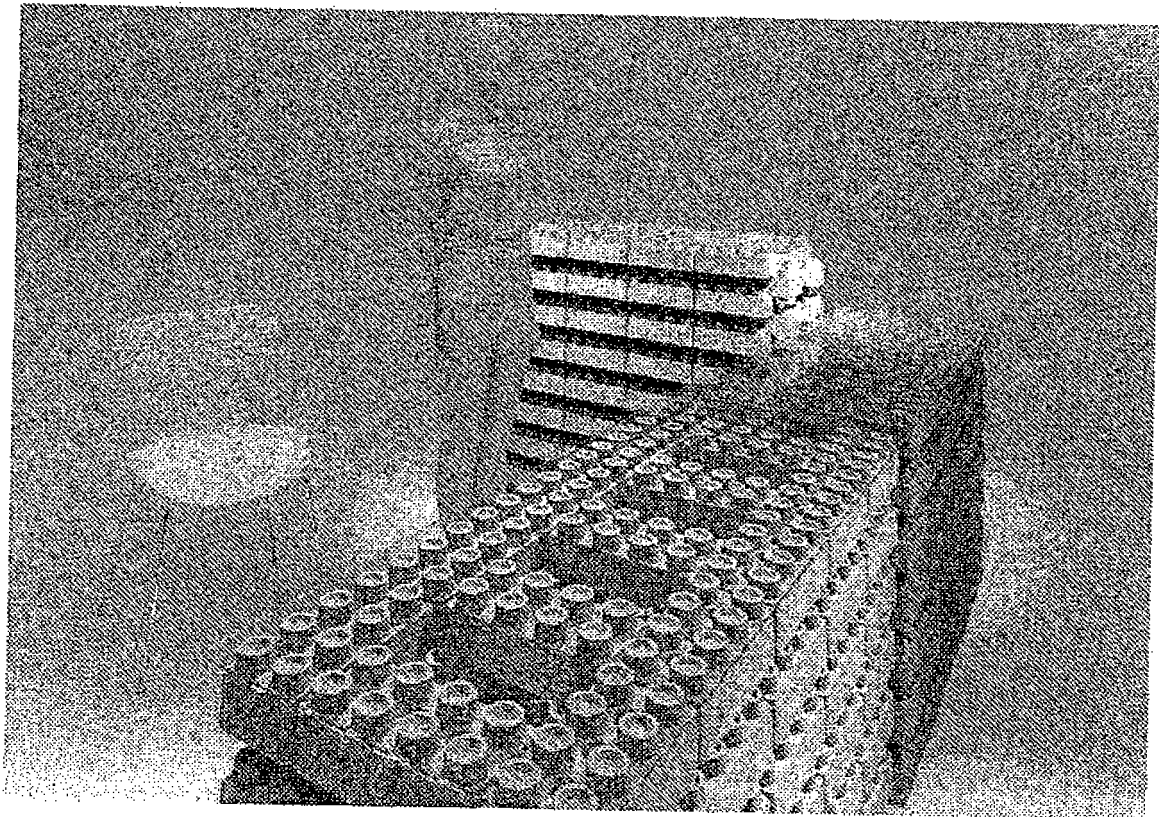


Fig. 6



INTERNATIONAL SEARCH REPORT

International application No.
PCT/RU 2019/050005

5	A. CLASSIFICATION OF SUBJECT MATTER A63H 33/06 (2006.01); A63H 33/08 (2006.01) According to International Patent Classification (IPC) or to both national classification and IPC		
10	B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) A63H 33/00-33/42, E04B 2/00-2/96 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
15	Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) PatSearch (RUPTO Internal), USPTO, PAJ, Espacenet, Information Retrieval System of FIPS		
20	C. DOCUMENTS CONSIDERED TO BE RELEVANT		
25	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
30	A	US 3005282 A (INTERLEGO A.G.) 24.10.1961	1-6
35	A	US 2011/0206872 A1 (ROBERT SWARTZ et al.) 25.08.2011	1-6
40	☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.		
45	* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "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) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "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 "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "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 "&" document member of the same patent family		
50	Date of the actual completion of the international search 10 April 2019 (10.04.2019)		Date of mailing of the international search report 16 May 2019 (16.05.2019)
55	Name and mailing address of the ISA/ RU		Authorized officer
	Facsimile No.		Telephone No.

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 3005282 A [0005] [0040]