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(54) **TOY BLOCK, A TOY BLOCK CONNECTING ELEMENT AND A TOY BLOCK ELEMENT FOR PRODUCING A TOY BLOCK**

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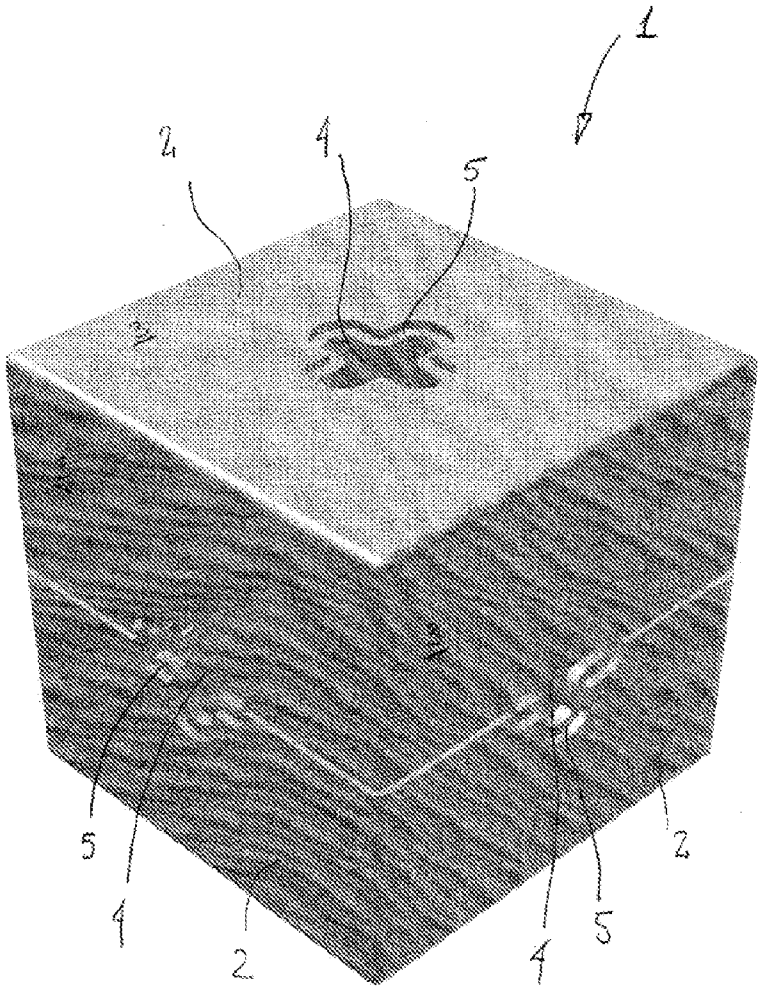
(57) **ABSTRACT**

Toy block (**1**) comprising a sidewall (**2**) with an inner surface and an outer surface (**3**) intended for abutment against a surface of a corresponding toy block, said sidewall (**2**) comprising a through hole (**4**) for receipt of a catch portion (**7**) of a connecting element (**6**) and a recess (**5**) in said outer surface (**3**) adjacent the through hole (**4**), and said toy block (**1**) comprising a catch for engaging and holding the catch portion (**7**) of a connecting element (**6**), said catch being situated in the interior of the toy block (**1**) in a distance from said inner surface, and at least one of said recess (**5**) and said through hole (**4**) is non-circular, toy block connecting element (**6**) for such a toy block (**1**) and toy block element (**11**) for producing such a toy block (**1**).



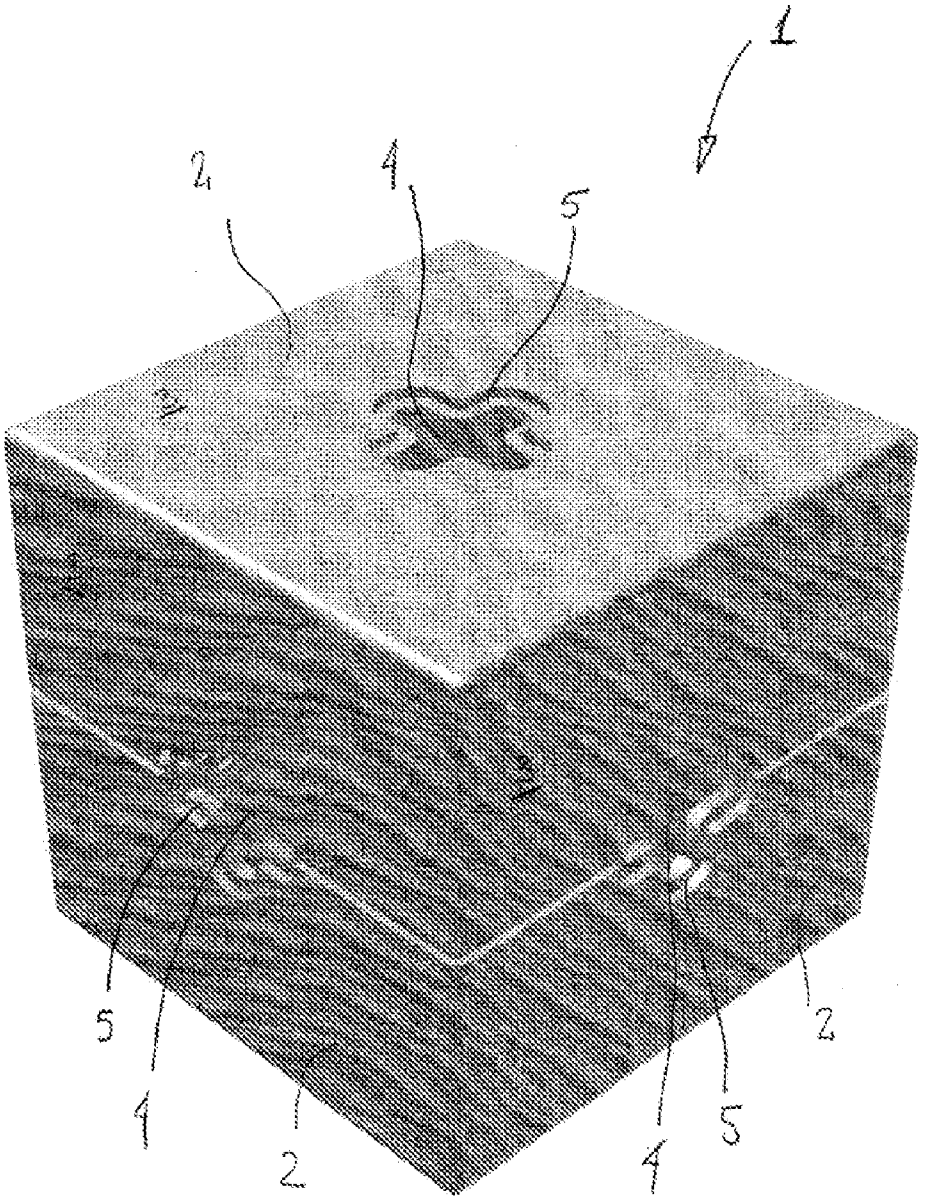
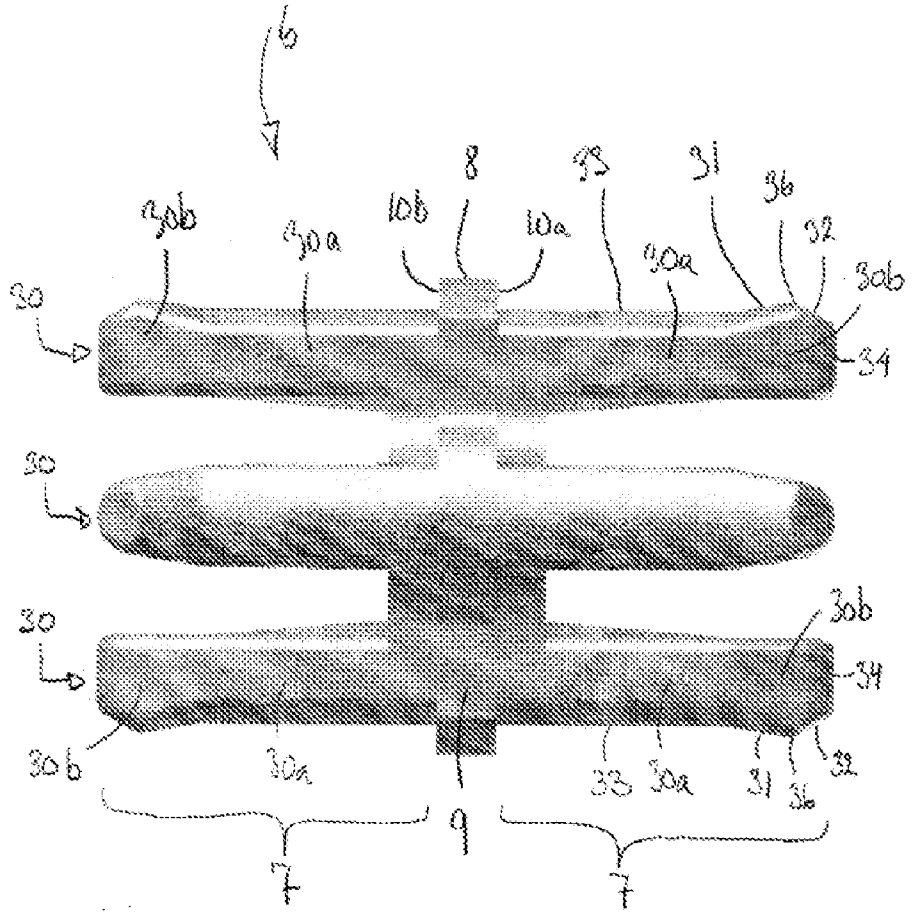


FIG. 1


6
8
33
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10b
10a
30a
30b
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7

FIG. 2A

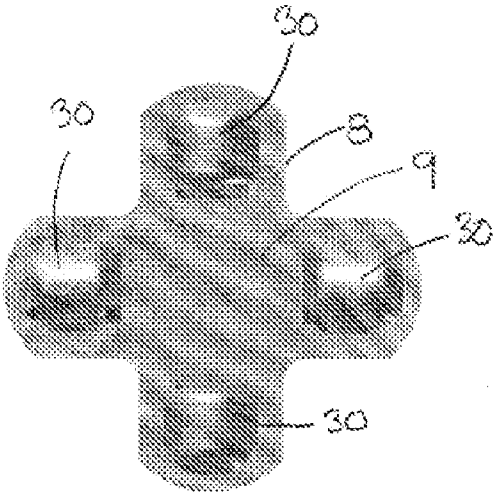

30
30
8
9
30
30

FIG. 2B

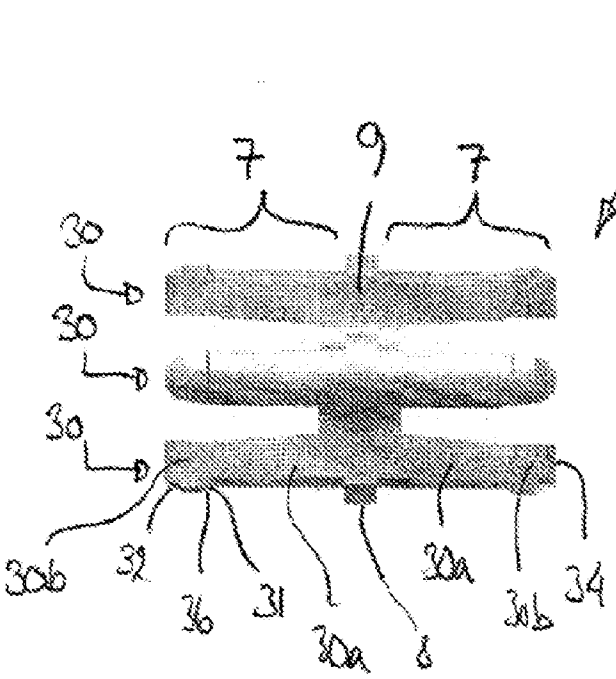


FIG. 3A

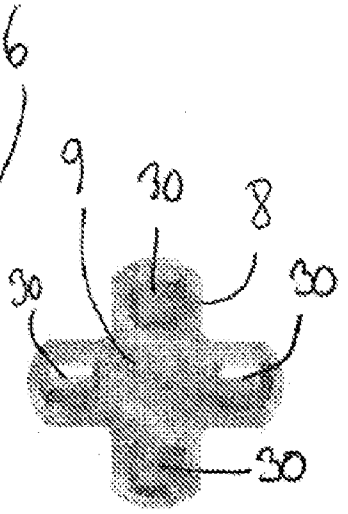


FIG. 3B

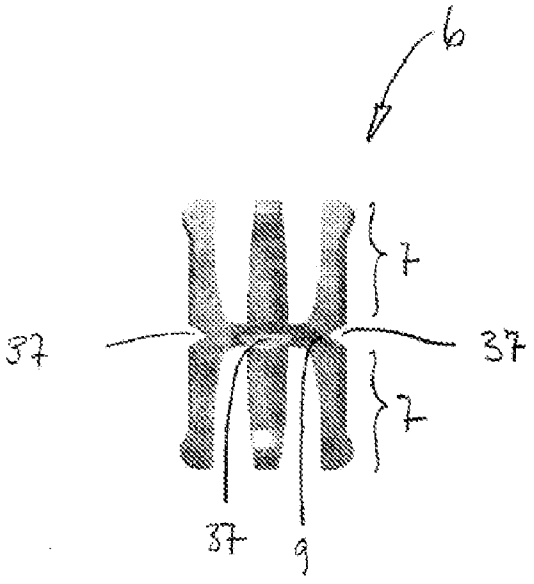


FIG. 4A

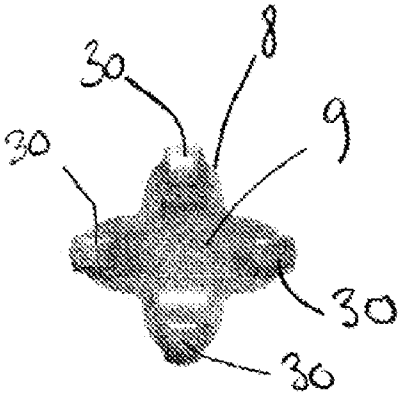


FIG 4B

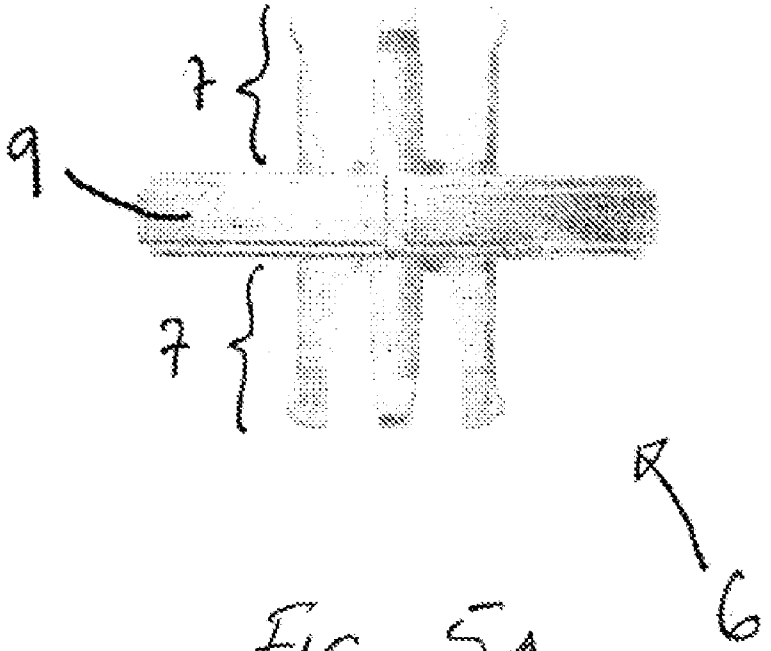


FIG 5A

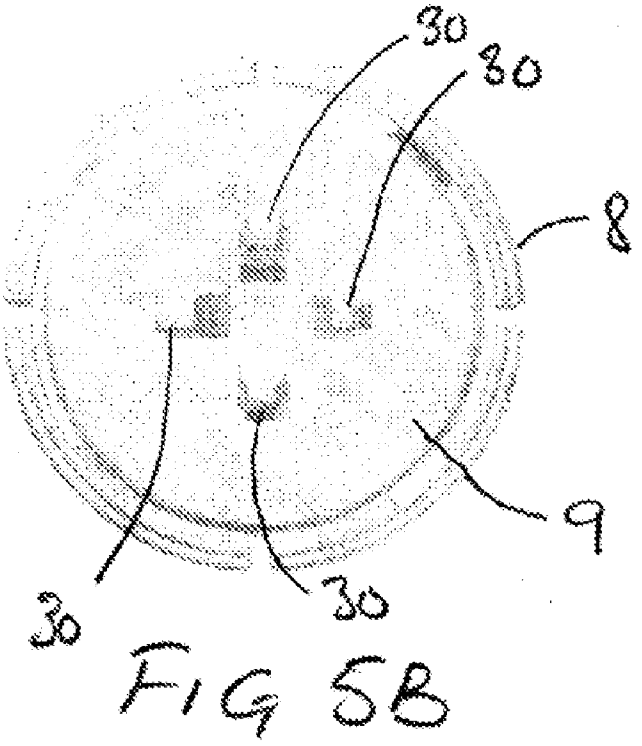


FIG 5B

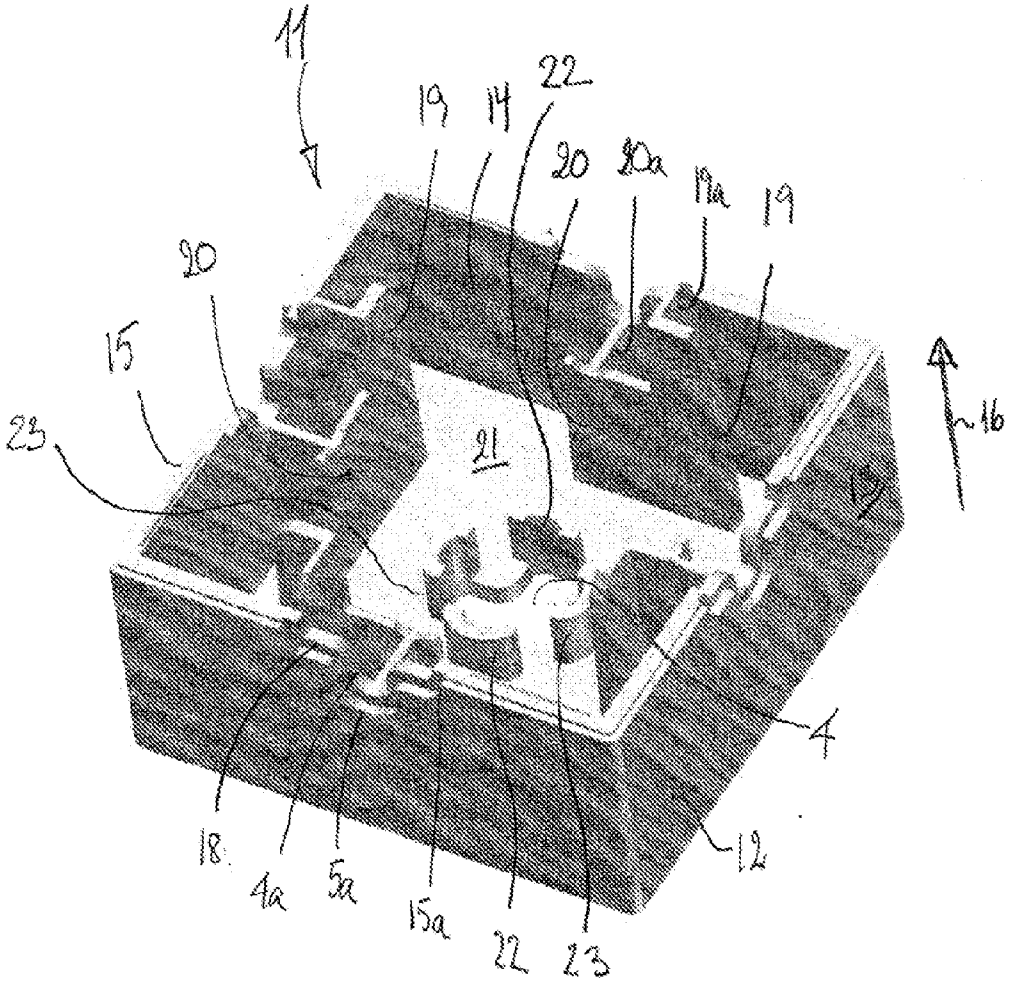
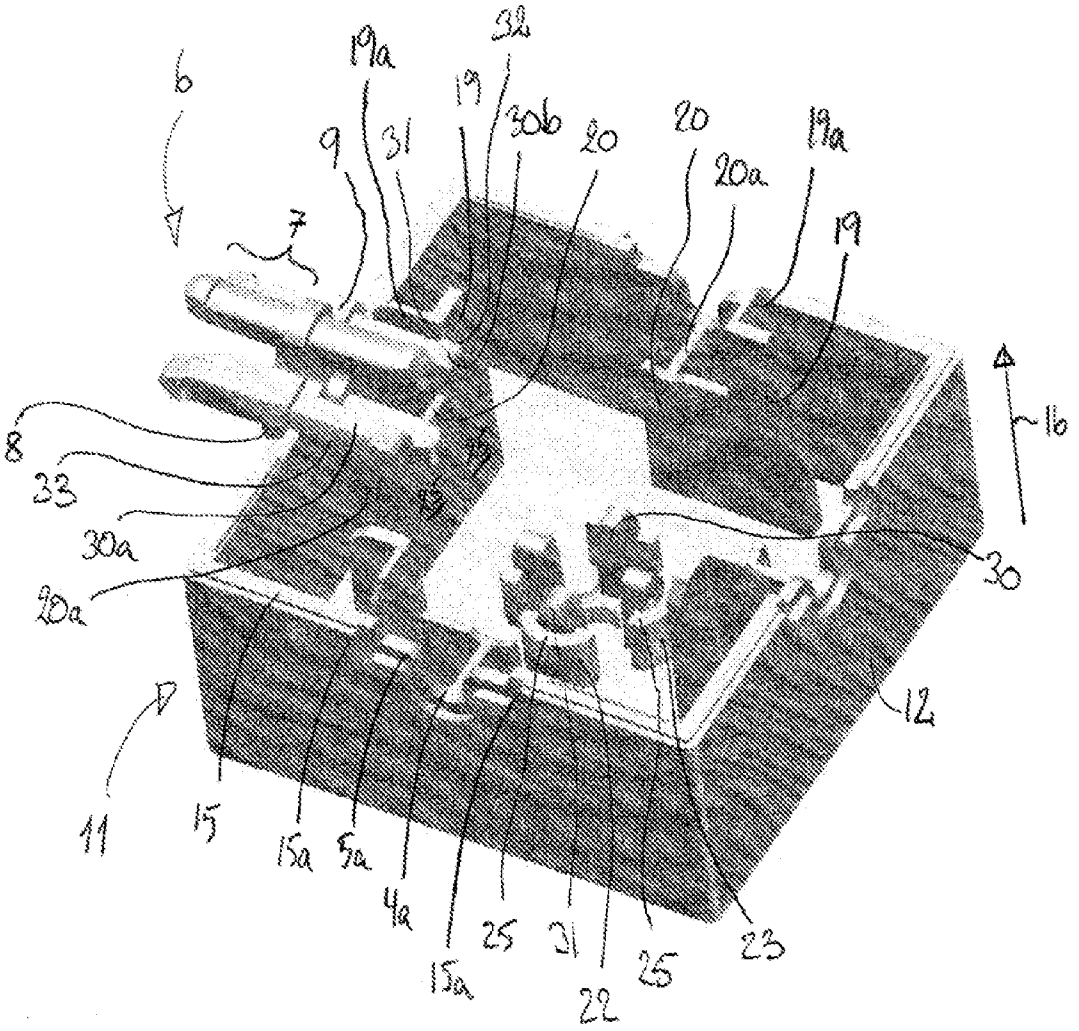


FIG. 6


6
19a
32a
19
9
31
30b
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20
19a
20a
7
19
8
33
30a
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11
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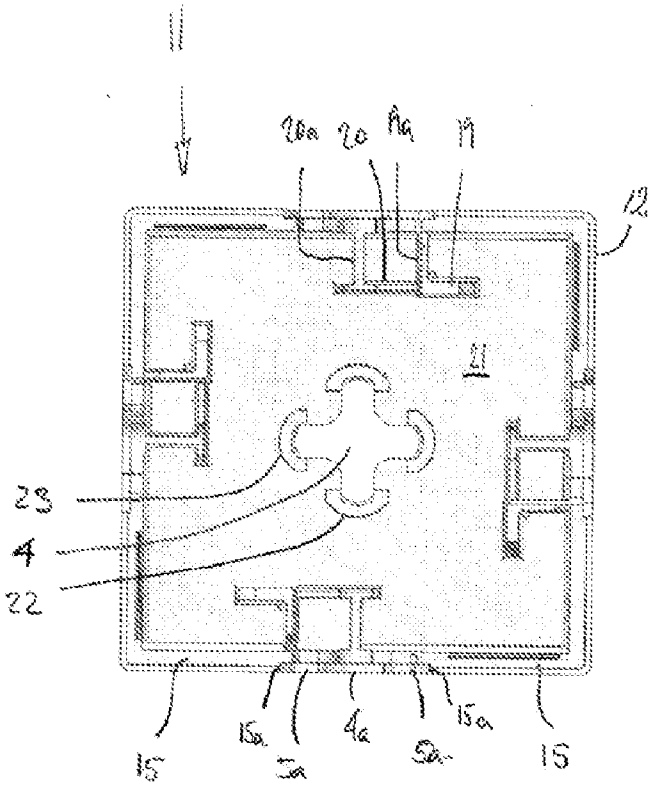
15a
5a
4a
25
31
15a
22
25
23

FIG. 7


11
20a
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19a
19
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4
22
15
15a
3a
4a
5a
15a
15

Fig. 8

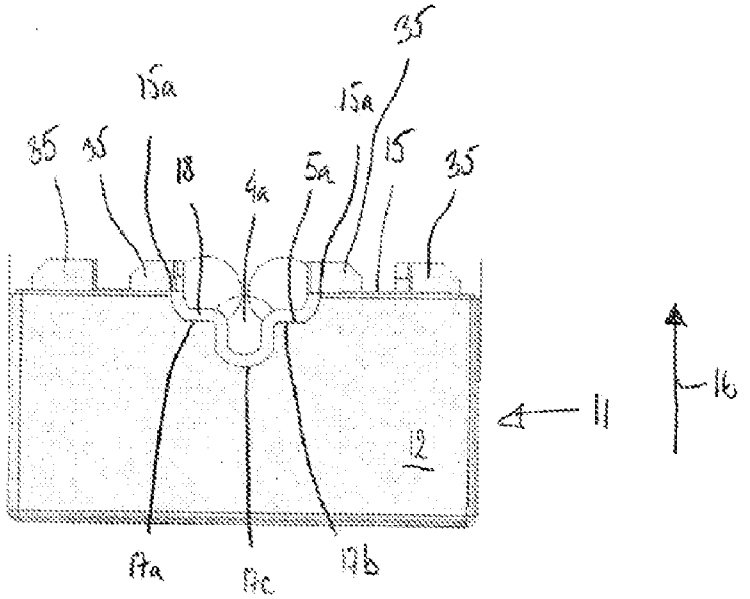
35
15a
15a
35
35
18
4a
5a
15
35
11
16
12
19a
19c
19b

Fig 9

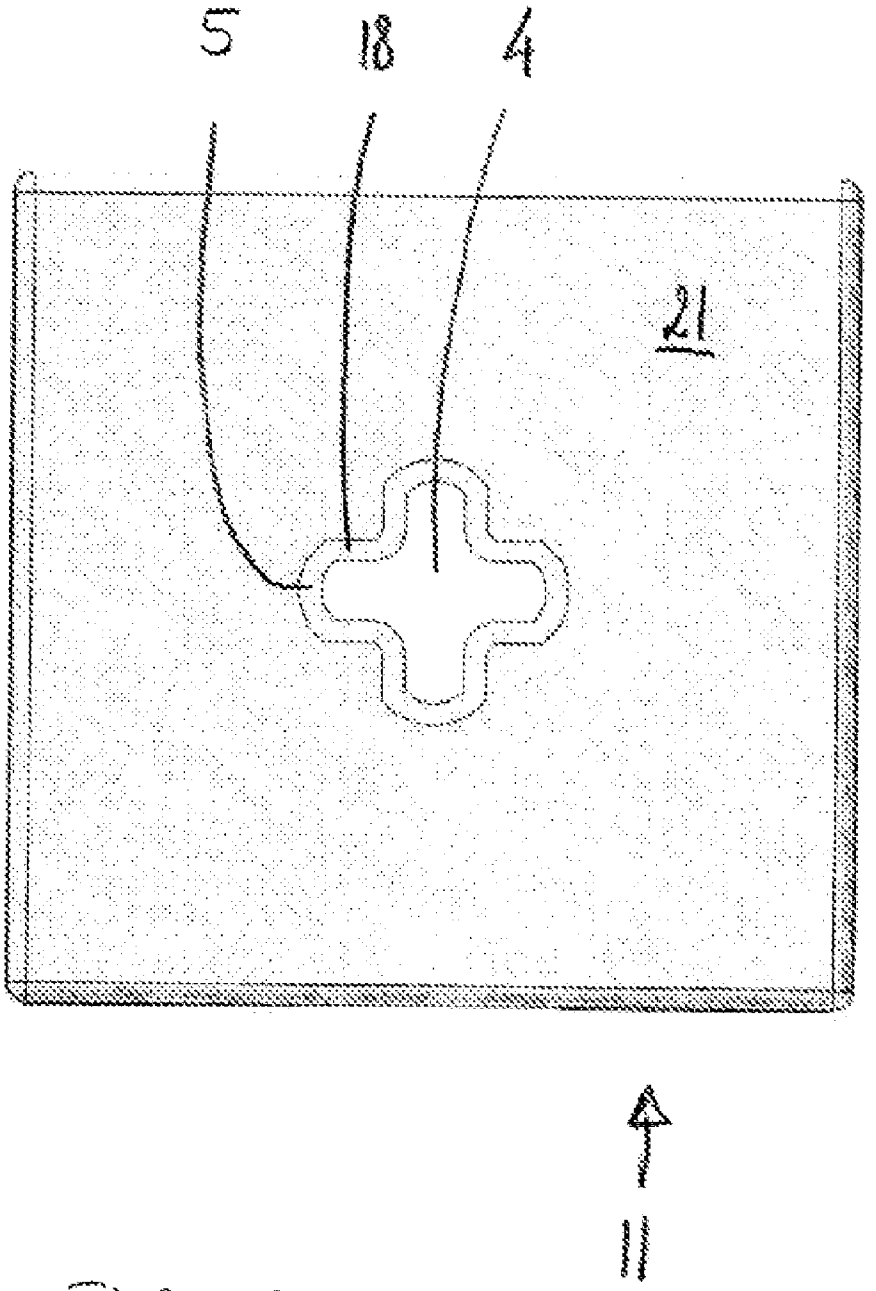

FIG. 10

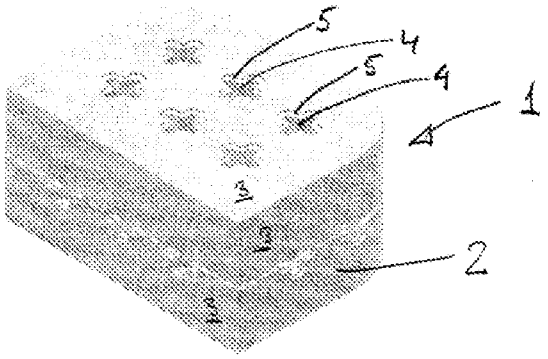

FIG. 11

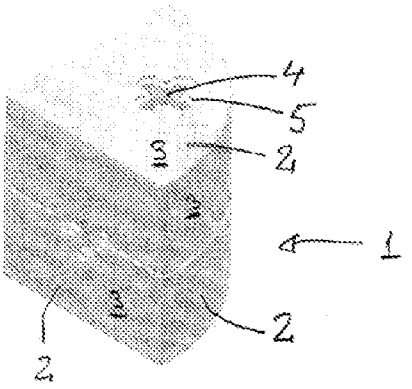

FIG. 12

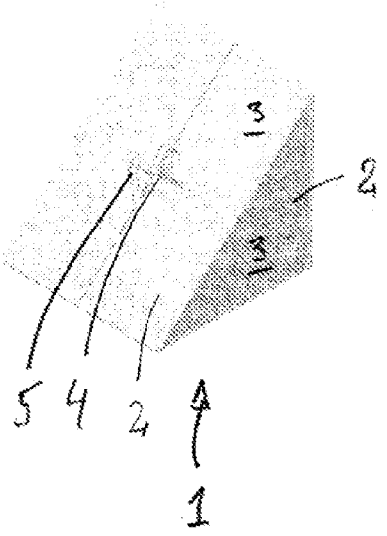

FIG. 13

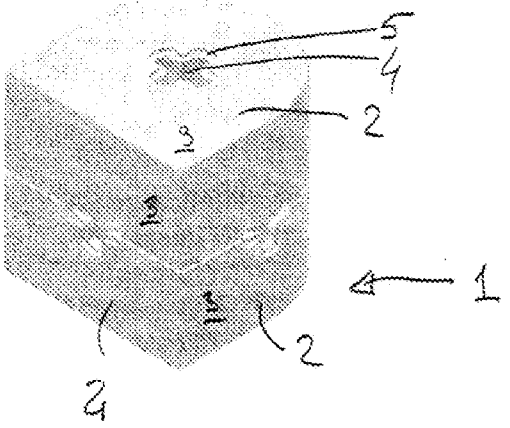

FIG. 14

TOY BLOCK, A TOY BLOCK CONNECTING ELEMENT AND A TOY BLOCK ELEMENT FOR PRODUCING A TOY BLOCK

[0001] The present invention relates to a toy block comprising a side-wall with an inner surface and an outer surface intended for abutment against a surface of a corresponding toy block said sidewall comprising a through hole for receipt of a catch portion of a connecting element and a recess in said outer surface adjacent the through hole, and said toy block comprising a catch for engaging and holding the catch portion of a connecting element. The present invention further relates to a toy block connecting element for interconnecting such toy blocks. The present invention further relates to a toy block element for producing such a toy block.

[0002] A toy block of the abovementioned type is known from U.S. Pat. No. 5,645,464. The known toy block is hollow and has a wall with a circular opening, a flange recessed within said opening, a central aperture and at least two holes adjacent to and in connection with said aperture. Each of the at least two holes further comprise semi-cylindrical resilient supports supporting two semicircular shaped knobs integrally connected with said flange for the purpose of interconnecting two toy blocks. Furthermore U.S. Pat. No. 5,645,464 discloses a switch lock for interconnecting said toy blocks by engagement with said retaining knob means. The switch lock comprises a rigid disc and two shafts attached to opposite sides of said disc. Each shaft comprises a head portion adapted to fit in said aperture and said holes of said opening in said toy block wall to be retained by said knobs. By engagement with said knob retaining means the head portion of said switch lock serves both the purpose of holding the blocks connected and prevent mutual rotation of block and connection element.

[0003] The prior known toy block is disadvantageous primarily in that the switch lock and the knob retaining means provide an unsatisfactory prevention of mutual rotation between block and connecting element during the engaging action.

[0004] Hence, the object of the present invention is to satisfactorily prevent mutual rotation between a toy block and a connection element for such a toy block when the connecting element is inserted in the toy block.

[0005] Another object of the invention is to provide a toy block element for producing such an improved toy block, which toy block element may be moulded in one piece and using one mould, hence being manufacturable in a simple and less costly process.

[0006] According to a first aspect of the invention these objects are achieved by a toy block of the abovementioned type, wherein said catch is situated in the interior of the toy block in a distance from said inner surface, and in that at least one of said recess and said through hole is non-circular. In a preferred embodiment said distance from said inner surface to said catch is at least 1 mm.

[0007] Thereby a toy block is provided in which prevention of mutual rotation between block and connecting element is provided by the non-circular recess and/or hole, and in which the catch portion serves to hold the blocks connected, hence separating these two actions spatially. Such a construction provides a considerable improvement of the prevention of mutual rotation between block and connecting element.

[0008] According to a second aspect of the invention the objects of the invention are achieved by a toy block connecting element for interconnecting toy blocks, comprising a central flat portion with two opposite surfaces and a circumference, a catch portion for engagement with a catch of the toy block rising from at least one of said surfaces, wherein at least one of the cross section of catch portion and the circumference of the flat portion is non-circular and wherein said catch portion comprises at least one catch leg, said catch leg comprising at least one engagement means on an outer section of the catch leg opposite said central flat portion.

[0009] Thereby a toy block connecting element is provided in which the at least one of the flat portion and the catch portion being non-circular upon insertion in a toy block may engage with that of the recess or through hole respectively likewise being noncircular of a toy block to lock the toy block connecting element with the toy block such that prevention of mutual rotation is considerably improved.

[0010] According to a third aspect of the invention the objects of the invention are achieved by a toy block element for producing a toy block according to the invention, wherein the toy block element comprises a circumferential wall comprising an outer surface, an inner surface and an open edge adapted to be joined with an open edge of a corresponding toy block element, said circumferential wall being cylindrical adjacent the open edge having a generator direction, said wall comprising adjacent its open edge in its outer surface at least one recess, said recess comprising a bottom, and a through hole in said bottom, said hole opening into the open edge, at least one of said recess and said through hole being non-semicircular, said toy block element further comprising at least one first leg portion extending parallel to the generator direction to a level in a vicinity of a level of the open edge to provide at least part of a catch of a toy block.

[0011] Thereby a toy block element is provided for producing a toy block according to the first aspect of the invention and as described above in a particularly simple and advantageous manner by joining the open edge of the toy block element with a corresponding toy block element such that the recesses of the respective toy block elements join to form a recess of the produced toy block, while the respective first leg portions form a catch of the toy block, hence providing the abovementioned advantages.

[0012] According to a particularly preferred embodiment the first leg element is resilient and flexible in a direction perpendicular to said generator direction, thereby providing a coupling between catch and catch portion and thereby block and connecting element making it easier, particularly for a child, to insert and remove said connecting element in and from said toy block.

[0013] According to a preferred embodiment the toy block element according to the invention further comprises at least one second leg portion extending parallel to the generator direction to a level in a vicinity of a peripheral point of the through hole opposite said open edge to provide part of a catch of a toy block. Thereby an improved and more stable hold of a connecting element according to the invention upon inserting such a connecting element in a through hole of a toy block produced by the use of such toy block elements is provided.

[0014] According to a particularly preferred embodiment at least one of said first leg portion and said second leg portion comprises a transversal portion extending over at least part of the distance between the inner surface of the circumferential

wall and the respective leg portion. Thereby a further improved hold of a connecting element according to the invention, particularly in a transverse direction of said connecting element, upon inserting such a connecting element in a through hole of a toy block produced by the use of such toy block elements is provided.

[0015] According to a preferred embodiment the at least one of said recess and said through hole being non-semicircular is shaped substantially as a halved cross. Thereby a non-semicircular recess, or through hole, is provided which may be constructed such that it is symmetric about a centre axis, whereby all toy block elements having identically shaped circumferential walls may be moulded using one and the same mould, thus providing a particularly cost effective toy block element.

[0016] According to a particularly preferred embodiment the at least one of said recess and said through hole being non-semicircular comprises a first and a second leg parts extending substantially in parallel with said open edge and separated by a third leg part extending substantially perpendicular to said open edge. Thereby a particularly simple embodiment of the abovementioned halved cross shape is provided.

[0017] According to a further particularly preferred embodiment of a toy block element according to the invention the toy block element comprises a base wall being merged in at least one of a curve and an angle with the circumferential wall opposite said open edge, wherein said base wall comprises at least one non-circular recess, said recess comprising a bottom and a through hole in said bottom, at least one of said recess and said through hole being non-circular, at least one third leg portion rising from the base wall adjacent said through hole into an interior of the toy block to provide at least part of a catch of a toy block. Thereby a toy block element is provided by which toy blocks produced by the use of such elements as a consequence of the additional wall provided may assume a wider range of geometrical shapes and may by the use of toy block connecting elements be combined in a wider range of possibilities as compared to a toy block produced by the use of toy block elements with no such base wall, the prior mentioned advantages regarding the hold and rotation of a toy block connecting element also being maintained as regards a catch of the base wall.

[0018] According to a particularly preferred embodiment said third leg portion is resilient and flexible in a direction perpendicular to said generator direction, thereby providing a coupling between catch and catch portion and thereby block and connecting element making it easier, particularly for a child, to insert and remove said connecting element in and from said toy block.

[0019] According to a preferred embodiment the base wall further comprises at least one fourth leg portion rising from the base wall adjacent said through hole to provide part of a catch of a toy block. Thereby an improved hold of a connecting element according to the invention upon inserting such a connecting element in a through hole of a base wall of a toy block produced by the use of such toy block elements is provided.

[0020] According to a preferred embodiment the fourth leg portion further comprises a transversal portion. Thereby a further improved hold of a connecting element according to the invention, particularly in a trans-verse direction of said connecting element, upon inserting such a connecting element in a through hole of a base wall of a toy block produced by the use of such toy block elements is provided.

[0021] According to a preferred embodiment of a toy block element according to the invention the said first, second, third and/or fourth leg portion further comprises at least one adjacent element adapted to support the first, second, third and/or fourth leg portion, whereby a toy block having further improved catch regarding stability and durability may be provided using such toy block elements.

[0022] According to a preferred embodiment at least a part of said circumferential wall and/or of said base wall is curved, thereby expanding the possible range of shapes of block elements considerably.

[0023] According to a particularly preferred embodiment the toy block element is moulded in one piece. Thereby the toy block may be produced using a particularly simple and cost efficient production process.

[0024] According to a fourth aspect of the invention a toy block comprising two toy block elements according to the invention is provided, said toy block elements being joined together by their respective open edges. The joining together of said toy block elements is preferably accomplished by welding, preferably ultrasonic sealing. Hereby a toy block with the desired advantages and a particularly simple and efficient sealing may be achieved by the use of a particularly simple sealing process.

[0025] According to a fifth aspect of the invention a toy building set comprising a plurality of toy blocks according to the invention, said toy blocks having one or more different outer shapes, and a plurality of toy block connecting elements according to the invention is provided.

[0026] The invention will now be described in further detail based on a non-limiting exemplary embodiment, and with reference to the drawings. In the drawings,

[0027] FIG. **1** shows a perspective view of an embodiment of a toy block according to the invention,

[0028] FIGS. **2***a* and **2***b* shows a side and a top view respectively of an embodiment of a toy block connecting element according to the invention,

[0029] FIGS. **3***a* and **3***b* shows a side and a top view respectively of a second embodiment of a toy block connecting element according to the invention,

[0030] FIGS. **4***a* and **4***b* shows a side and a top view respectively of a third embodiment of a toy block connecting element according to the invention,

[0031] FIGS. **5***a* and **5***b* shows a side and a top view respectively of a fourth embodiment of a toy block connecting element according to the invention,

[0032] FIG. **6** shows a perspective view of one embodiment of a toy block element according to the invention,

[0033] FIG. **7** shows a perspective view of a toy block element according to FIG. **6** engaging two connecting elements according to FIG. **2***a*,

[0034] FIG. **8** shows a toy block element according to FIG. **6** seen from above,

[0035] FIG. **9** shows the outside of a toy block element according to FIG. **6** seen from one side,

[0036] FIG. **10** shows the outside of a toy block element according to FIG. **6** seen from below, and

[0037] FIGS. **11-14** show four other embodiments of toy block elements according to the invention being shaped as a D, a quarter circle, a triangle and a U respectively.

[0038] With reference to FIG. **1** a toy block **1** according to the invention comprises a side wall **2** with an inner surface

(not visible) facing the interior of the toy block **1** and an outer surface **3** intended for abutment with another toy block. The side wall **2** comprises one or more through holes **4** (a total of three are shown) and a recess **5** in the surface **3** adjacent each through hole **4**. At least one of the recess **5** and the through hole **4** is non-circular. In the embodiment shown, both the recess **5** and the through hole **4** are shaped substantially as a cross, but any non-circular shape such as for instance rectangular or triangular may in principle be used and only one of the recess **5** and the through hole **4** need necessarily be non-circular. The through hole **4** is intended for receipt of a toy block connecting element, a preferred embodiment of such a toy block connecting element being shown in FIGS. **2**A and **2**B. In the embodiment of the toy block **1** shown in FIG. **1**, the toy block consists of two toy block elements according to the invention being joined along a joint **24**. The toy block element according to the invention and the joining together of such toy block elements will be described in detail below.

[0039] With reference to FIGS. **2**A and **2**B a preferred embodiment of a toy block connecting element **6** according to the invention comprises a central flat portion **9** with two opposite surfaces **10***a*, **10***b*, the flat portion **9** having a circumference **8**. The shape of the circumference **8** is such that it fits in a recess of a toy block. In the embodiment shown, the circumference **8** is shaped substantially as a cross to fit in the cross shaped recess **5** of the toy block **1** according to FIG. **1**, but any shape of circumference may in principle be used, as long as the shape of the circumference matches at least a part of that of a recess of a toy block. Rising from either surface **10***a*, **10***b* is a catch portion **7**. In the embodiment shown each of the catch portions **7** comprise four separate catch legs **30**. Each catch leg **30** is preferably resilient and comprises an inner catch leg section **30***a* and an outer catch leg section **30***b*. The inner catch leg section **30***a* comprises an outward facing surface **33**. The outer catch leg section **30***b* comprises an outward facing surface having two surface sections **31** and **32**. In the preferred embodiment as shown in FIGS. **2**A and **2**B the surface section **31** raises gradually from the level of the outward facing surface **33** of the inner catch leg section **30***a* to a highest point **36** situated between the ends of the outer catch leg section **30***b*. The surface sections **31** and **32** adjoin at said highest point **36** from which the surface section **32** gradually falls to reach its lowest level at its end opposite surface section **31**. Thus the surface sections **31**, **32** in combination provide an engagement means in the form of a projection on the outer catch leg section **30***b*. In principle the engagement means could also be an indentation in the outer catch leg section **30***b*. The length of the inner catch leg **30***a* substantially equals a distance between the inner surface and the corresponding leg portion of the catch of a toy block **1**, such that the outer catch leg portion **30***b* with its projection may in a snap locking manner engage with a catch of a toy block **1**, the catch portion **7** thus providing an engagement with a catch of a toy block **1** upon insertion in the toy block **1**. Such a catch of a toy block **1** will be described in detail below.

[0040] FIGS. **3**A and **3**B shows an alternative embodiment of a toy block connecting element according to the invention. The toy block connecting element **6** of FIGS. **3**A and **3**B is identical with that of FIGS. **2**A and **2**B except for the embodiment of the outer catch leg section **30***b*. In this particular embodiment the surface section **31** of the outer catch leg section **30***b* rises substantially perpendicular to the outward facing surface **33** of the inner catch leg section **30***a* to a highest point **36** from which the surface section **32** falls gradually to reach its lowest level at its end opposite surface section **31**. This embodiment provides for a tighter engagement with a catch of a toy block as compared to the preferred embodiment of FIGS. **2**A and **2**B, the latter being somewhat easier to release in order to separate toy block and connecting element. Thus a steeper raising angle of the surface section **31** provides a tighter engagement with a catch of a toy block. The gradual raise of the surface section **32** serves to provide an easier insertion of the catch portion **7** into a through hole of a toy block.

[0041] In further embodiments of a toy block connecting element according to the invention the catch legs **30** may be resilient or rigid, and fewer or more catch legs **30** may be provided i.a. depending on the shape of the central portion **9** and/or the shape of the catch of the toy block. For instance a central intermediate portion rising from the central flat portion **9** and extending between at least two of the catch legs **30** may be provided joining two or more of the catch legs **30**. In a not shown embodiment the presence of such a central intermediate portion may result in a catch portion having a cross sectional shape of for instance a plus or a circle. Furthermore, as shown on the figs., the tip **34** of each of the outer catch leg sections **30***b* of each catch leg **30** is preferably rounded such as to prevent sharp ends, that may inflict damage upon blocks and/or users when connecting toy blocks **1**. Of crucial importance is solely the configuration of the outwards facing surface sections corresponding to **31**, **32** of FIG. **2**A, that the shape of the flat central section **9** and the recess **5** match and that the cross sectional shape of the catch portion **7** is such that it at least may be inserted in the hole **4** and preferably matches the shape of the hole **4**.

[0042] Shown in FIGS. **4**A and **4**B is another embodiment of a connecting element **6** according to the invention. This embodiment differs from that of FIGS. **2**A and **2**B in two regards. Firstly, the circumference **8** of the flat portion **9** is provided with a number of notches **37** situated on the part of the circumference **8** intermediate between a catch leg **30** of each of the catch portions **7**. This embodiment provides for added flexibility of the catch legs **30** as compared to the embodiment of FIGS. **2**A and **2**B. Secondly, the part of the circumference **8** intended to abut the recess **5** of a toy block **1** as described further below is limited to constitute the sections between each two catch legs **30**.

[0043] When inserting such a toy block connecting element according to the embodiment shown in FIGS. **2**A and **2**B in a toy block according to the invention, a catch portion **7** is pushed through the through hole **4** to be received by a catch of a toy block **1**, the catch being situated in the inside of the toy block, thus not being visible in FIG. **1**. The catch portion **7** is pushed into the toy block **1** until the circumference **8** of the flat portion **9** abuts the recess **5** of the toy block **1**. In this way the engagement between the catch of the toy block and the catch portion **7** of the connecting element prevents longitudinal movement of the connecting element **6**, while the engagement between those of flat portion **9** and recess **5** or through hole **4** and catch portion **7** having at least partially matching non-circular circumferences prevent radial movement of the connecting element **6**. The other catch portion **7** of the connecting element **6** may then be inserted in a through hole **4** and catch of another toy block **1**, thus connecting the two toy blocks. In this way the engagement holding the toy blocks together and the engagement preventing rotation of the blocks both with respect to each other and with respect to the connecting element are separated. Furthermore, to ensure that

the outer surfaces **3** of the two toy blocks **1** abut each other upon connection with a connecting element **6**, the thickness of the central flat portion **9** of the connecting element **6** preferably substantially equals or is slightly smaller than the combined depth of the recesses **5** in the respective surfaces **3**.

[0044] Notwithstanding the above it may, however, when building structures by connecting toy blocks according to the invention be desirable to be able to rotate one of two toy blocks **1** held together by a connecting element **6** relative to the other block without compromising the engagement holding the blocks together. To achieve this the central flat portion **9** of a connecting element according to the invention may, in another embodiment shown in FIGS. **5**A and **5**B, be provided in two parts coupled together using a frictional coupling. Such a frictional coupling may provide for continuous or graduated rotation. In this way the two catch portions **7** may be rotated relative to each other about their longitudinal axis.

[0045] Referring now to FIG. **6** showing a perspective view and FIG. **8** showing a top view of a toy block element **11** according to the invention, such a toy block element **11** comprises in the embodiment shown a circumferential wall **12** and a base wall **21**. The circumferential wall **12** comprises an outer surface **13**, an inner surface **14** and an open edge **15**. Adjacent the open edge **15** the circumferential wall **12** is cylindrical with an axial direction being parallel with a generator direction defined by an arrow **16** shown in FIG. **6**. The circumferential wall **12** furthermore comprises adjacent its open edge **15** a recess **5***a*. As it is seen more clearly in FIG. **9**, the recess **5***a* comprises a bottom **18** and a through hole **4***a* in the bottom **18**. The through hole **4***a* opens into the open edge **15** such that the adjacent recess **5***a* forms a transition **15***a* with the open edge **15** at either side of the through hole **4***a*. Upon joining the open edge **15** with the open edge of a corresponding toy block element the transitions **15***a* of the toy block element **11** are intended to coincide with the corresponding transitions between the open edge and the recess of the corresponding toy block element. According to the invention at least one of the recess **5***a* and the through hole **4** is non-semicircular.

[0046] In the embodiment shown both the through hole **4***a* and the recess **5***a* are shaped substantially as a halved cross. In a particularly preferred embodiment of such a halved cross, that is shown in detail in the side view of FIG. **9**, the recess **5***a* and the hole **4***a* comprise two recess legs **17***a*, **17***b* extending substantially in parallel with the open edge **15** and separated by a recess leg **17***c* extending substantially perpendicular to the open edge **15**. However any non-semicircular shape may in principle be used and only one of the recess **5***a* and the through hole **4***a* need be non-semicircular in shape.

[0047] Referring again to FIG. **6**, in the embodiment shown the circumferential wall **12** comprises four equally sized sides, thus forming a block element **11** with a quadratic shape. A circumferential wall of a toy block element according to the invention however merely need have at least one side, and may in principle have any number of sides equal to or larger than one, and each side may be straight, partially curved or curved as desired, thus providing for a large variety of shapes of toy block elements.

[0048] The toy block element **11** further comprises at least one first leg portion **19**. The first leg portion **19** extends in a direction parallel to a generator direction denoted on FIG. **6** by an arrow **16** to a level in a vicinity of a level of the open edge **15** and is situated inside the circumferential wall **12** at a distance from the inner surface **14**, the distance preferably in any case being at least 1 mm. In the preferred embodiment of a toy block according to the invention, this distance is preferably approximately 4 mm. This distance, however, obviously depends on the overall size of the toy block such that the larger the toy block is, the larger the preferred distance will be, the mentioned approximately 4 mm being intended used in a toy block having a size in the order of 3×3×3 cm in the cubic version shown in FIG. **1**. The first leg portion **19** thus provides at least part of a catch of a toy block **1** according to the invention. The first leg portion **19** may be resilient in a direction perpendicular to said generator direction **16**. The first leg portion **19** may furthermore comprise a transverse portion **19***a* extending over at least part of the distance between inner surface **14** and first leg portion **19**. In the embodiment shown the transverse portion **19***a* covers the entire said distance, thus connecting the first leg portion **19** and the inner surface **14**. At the inner surface **14** the transverse portion **19***a* is preferably shaped such as to be substantially flush with the adjacent section of the circumference of the through hole **4***a*, substantially without covering any of the open area of the through hole **4***a*.

[0049] The toy block element **11** may further comprise at least one second leg portion **20**. The second leg portion **20** extends in a direction parallel to the generator direction **16** to a level in a vicinity of peripheral point of the through hole **4***a* opposite the open edge **15** and is situated inside the circumferential wall **12** at a distance from the inner surface **14**, the distance preferably being between 3 mm and 10 mm. The second leg portion **20** thus provides part of a catch of a toy block **1** according to the invention. The second leg portion **20** is preferably of a rigid structure. The second leg portion **20** may furthermore comprise a transverse portion **20***a* extending over at least part of the distance between inner surface **14** and second leg portion **20**. In the embodiment shown the transverse portion **20***a* covers the entire said distance, thus connecting the second leg portion **20** and the inner surface **14**. At the inner surface **14** the transverse portion **20***a* is preferably shaped such as to be substantially flush with the adjacent section of the circumference of the through hole **4***a*, substantially without covering any of the open area of the through hole **4***a*.

[0050] The transverse portions **19***a*, **20***a* extend in the generator direction **16** and may furthermore serve to support the catch portion **7** of a connecting element **6** upon insertion such that the outward facing surface **33** and surface sections **31**, **32** of a catch leg **30** may slide along a surface of a transverse portion **19***a* or **20***a*, thus facilitating the insertion (and later removal) of a connecting element **6** in a toy block **1**. In this embodiment the transverse portions **19***a*, **20***a* extend to a level flush with the level to which the corresponding leg portion **19**, **20** respectively extends. The thickness of the transverse portions **19***a* and in particular **20***a* should preferably be sufficient to serve their supportive purpose, but is otherwise of lesser importance.

[0051] In the embodiment shown both the first **19** and the second **20** leg portion furthermore extend in a plane parallel to the circumferential wall **12** such that they meet each other. This provides for a simple and particularly durable structure of the catch. The presence of transverse portions **19***a* and **20***a* would improve durability of the catch of the toy block even further.

[0052] In other embodiments the first **19** and/or the second **20** leg portion may comprise one or more further adjacent elements (not shown) to further support and stabilize the leg portions **19**, **20**.

[0053] In the embodiment shown a complete catch of a toy block assembled of two toy block elements **11** would thus comprise two first leg portions **19** and two second leg portions **20**. However it is in principle possible in the simplest form to omit (or indeed substitute them for further first leg portions **19**) the second leg portions **20**, thus letting the catch comprise two leg portions **19** only.

[0054] In the embodiment shown the toy block element **11** further comprises a base wall **21**. The base wall **21** is shown as merged in a right angle with the circumferential wall **12**, but may also in other embodiments be merged in another angle or in a curve with the circumferential wall **12**, thus increasing the number of possible shapes of toy block elements according to the invention even further. In a further embodiment it is even possible to omit the base wall **21**, thus providing for toy block elements being shaped as for instance a halved circular or elliptical sphere.

[0055] In the embodiment shown, and as further illustrated in FIG. **10**, the base wall **21** further comprises a recess **5** with a bottom **18** and a through hole **4** in the bottom **18**. As shown in FIG. **6** two third leg portions **22** extend from the base wall **21** and into the interior of the toy block element, the third leg portions **22** being situated adjacent said through hole **4**. The third leg portion **22** provides at least part of a catch of a toy block according to the invention. The third leg portion **22** may be resilient and flexible in a direction perpendicular to the generator direction **16**.

[0056] Furthermore two fourth leg portions **23** are shown to and may extend from the base wall **21** and into the interior of the toy block element, the fourth leg portions **23** also being situated adjacent said through hole **4**. In the embodiment shown the fourth leg portions **23** and the third leg portions **22** are identically shaped. The fourth leg portions **23** are preferably rigid in structure and provide part of a catch of a toy block according to the invention.

[0057] On the figures the one recess **5** in the base wall **21** is shown situated in a central position on the base wall **21**. However any desired position may in principle be used, and furthermore more than one recess **5** with related hole **4** and catch may be provided in the base wall **21**.

[0058] In the embodiment shown a complete catch of a base wall **21** of a toy block element **11** would thus comprise two third leg portions **22** and two fourth leg portions **23**. However it is in principle possible in the simplest form to omit (or indeed substitute them for further third leg portions **22**) the fourth leg portions **23**, thus letting the catch comprise two leg portions **22** only.

[0059] FIG. **7** shows a toy block element **11** identical to that of FIG. **6** in which the engagement between a catch of a toy block, i.e. the first **19** and second **20** leg portions of a circumferential wall **12** or the third **22** and fourth **23** leg portions of a base wall **21**, and a catch portion **7** of a connecting element **6** (in FIG. **7** a connecting element **6** of the type shown in FIGS. **3**A and **3**B) is illustrated. It can be seen that the projection provided by the outward facing surface sections **31**, **32** of the outer catch leg section **30***b* engage behind the respective leg portion **19**, **20**, **22** or **23**, such that the surface section **31** of the outer catch leg section **30***b* abuts against the surface **25** of the respective leg portion facing the interior of the toy block element, to provide a hold in the longitudinal direction of the connecting element **6**.

[0060] Considering the embodiment of a connecting element **6** shown in FIGS. **2**A and **2**B, in which the surface section **31** as described previously rises gradually, only a part of the surface section **31** of the outer catch leg section **30***b* adjacent the surface section **33** of the inner catch leg section **30***a* would abut against a surface **25**, thus providing a less tight longitudinal hold, the connecting element consequently being easier to release, particularly for a child.

[0061] A toy block element according to the invention may be produced entirely in the same relatively hard and durable plastic material by injection moulding. A preferred such material is ABS (Acrylonitrile Butadiene Styrene). To produce a toy block element constructed according to the invention in principle only one mould is needed for each shape of toy block element, and only one moulding step is required to form each element.

[0062] A toy block connecting element according to the invention may be produced of the same plastic material as the toy block elements and likewise by injection moulding. Preferably, however, the toy block connecting elements are made of polycarbonate.

[0063] As mentioned previously one or more of the catch portion of the connecting element and the first and third leg portions of the catch of the toy block (and in principle, but less preferred, also the second and fourth leg portions of the catch) may be made resilient and flexible. Such flexibility and resilience is preferably achieved by constructing the mould used to provide the elements in question with suitable structural dimensions, for instance by making them sufficiently thin to be resilient. However another but less preferred possibility is to use a more resilient plastic material for moulding the elements resilient and flexible elements. To produce a toy block according to the invention two toy block elements according to the invention are joined by bringing their respective open edges **15** to abut against each other and subsequently seal the open edges **15** to each other by for instance welding, preferably ultrasonic sealing. Alternatively the joining may be accomplished by the use of an adhesive agent, a frictional coupling or by providing each two toy block elements with corresponding locking elements at their respective open edges **15**.

[0064] When each two toy block elements are provided with corresponding locking elements, an alternative way of coupling connection elements and toy blocks together is to join the toy block elements together around one or more toy block connecting elements by placing the connecting elements in one of the toy block elements as the toy block connecting element **6** is placed in the toy block element **11** in FIG. **7**.

[0065] To aid in the process of bringing the respective open edges to abut correctly along the whole circumference of the circumferential wall **12** a plurality of plate shaped projections **35** may furthermore be provided along the open edge **15** of a toy block element **11**. An example of such projections **35** is shown in FIG. **9**.

[0066] Depending on the shape of the toy block elements a wide range of differently shaped toy blocks according to the invention may be achieved. Examples of different shapes of toy blocks are shown in FIGS. **11**-**14**, of which FIG. **11** shows toy block with a D-shaped side wall, FIG. **12** shows a toy block with a side wall shaped as a quarter circle, FIG. **13**

shows a toy block with a triangular side wall, and FIG. **14** shows a toy block with a U-shaped side wall.

[0067] It should be noted that the above description of preferred embodiments is merely an example, and that the skilled person would know that numerous variations are possible without departing from the scope of the claims.

1.-**21**. (canceled)

22. Toy block comprising

a sidewall with an inner surface and an outer surface intended for abutment against a surface of a corresponding toy block, said sidewall comprising

a through hole for receipt of a catch portion of a connecting element and

a recess in said outer surface adjacent the through hole and

said toy block comprising a catch for engaging and holding the catch portion of a connecting element

wherein said catch is situated in the interior of the toy block in a distance from said inner surface, and

at least one of said recess and said through hole is non-circular.

23. Toy block according to claim **22**, wherein said distance from said inner surface to said catch is at least 1 mm.

24. Toy block connecting element for interconnecting toy blocks, comprising

a central flat portion with two opposite surfaces and a circumference,

a catch portion for engagement with a catch of the toy block rising from at least one of said surfaces,

wherein at least one of the cross section of catch portion and the circumference of the flat portion is non-circular and

said catch portion comprises at least one catch leg, said catch leg comprising at least one engagement means on an outer section of the catch leg opposite said central flat portion.

25. Toy block connecting element according to claim **24**, wherein said catch portion comprises at least two catch legs, at least one of said catch legs comprising at least one projection on an outer section of the catch leg opposite said central flat portion.

26. Toy block element for producing a toy block according to claim **22** wherein it comprises a circumferential wall comprising an outer surface, an inner surface and an open edge adapted to be joined with an open edge of a corresponding toy block element, said circumferential wall being cylindrical adjacent the open edge having a generator direction, said wall comprising adjacent its open edge in its outer surface at least one recess, said recess comprising a bottom, and a through hole in said bottom, said hole opening into the open edge, at least one of said recess and said through hole being non-semicircular, said toy block element further comprising at least one first leg portion extending parallel to the generator direction to a level in a vicinity of a level of the open edge to provide at least part of a catch of a toy block.

27. Toy block element according to claim **26**, wherein said first leg element is resilient and flexible in a direction perpendicular to said generator direction.

28. Toy block element according to claim **26** further comprising at least one second leg portion extending parallel to the generator direction to a level in a vicinity of a peripheral point of the through hole opposite said open edge to provide part of a catch of a toy block.

29. Toy block element according to claim **28**, wherein at least one of said first leg portion and said second leg portion comprises a transversal portion extending over at least part of the distance between the inner surface of the circumferential wall and the respective leg portion.

30. Toy block element according to claim **26**, wherein the at least one of said recess and said through hole being non-semicircular is shaped substantially as a halved cross.

31. Toy block element according to claim **26**, wherein the at least one of said recess and said through hole being non-semicircular comprises a first and a second recess leg extending substantially in parallel with said open edge and separated by a third recess leg extending substantially perpendicular to said open edge.

32. Toy block element according to claim **26**, further comprising a base wall, said base wall being merged in at least one of a curve and an angle with the circumferential wall opposite said open edge, wherein said base wall comprises at least one recess, said recess comprising a bottom and a through hole in said bottom, at least one of said recess and said through hole being non-circular, at least one third leg portion rising from the base wall adjacent said through hole into an interior of the toy block to provide at least part of a catch of a toy block.

33. Toy block element according to claim **32**, wherein said third leg is being resilient and flexible in a direction perpendicular to said generator direction.

34. Toy block element according to claim **32**, wherein said base wall further comprises at least one fourth leg portion rising from the base wall adjacent said through hole to provide part of a catch of a toy block.

35. Toy block element according to claim **34**, wherein said fourth leg portion further comprises a transversal portion.

36. Toy block element according to claim **32**, wherein the at least one of said recess and said through hole in said base wall being non-circular is shaped substantially as a cross.

37. Toy block element according to claim **34**, wherein said first, second, third and/or fourth leg portion further comprises at least one adjacent element adapted to support said first, second, third and/or fourth leg portion.

38. Toy block element according to claim **26**, wherein at least a part of said circumferential wall and/or of said base wall is curved.

39. Toy block element according to claim **26**, wherein the toy block element is moulded in one piece.

40. Toy block comprising two toy block elements according to claim **26**, said toy block elements being joined together by their respective open edges.

41. Toy block according to claim **40**, wherein said joining together of said toy block elements is accomplished by welding, preferably ultrasonic sealing.

42. Toy building set comprising

a plurality of toy blocks, said toy blocks having one or more different outer shapes, and

a plurality of toy block connecting elements,

wherein each toy block comprises a sidewall with an inner surface and an outer surface intended for abutment against a surface of a corresponding toy block, said sidewall comprising

a through hole for receipt of a catch portion of a connecting element and a recess in said outer surface adjacent the through hole and said each toy block further comprising a catch for engaging and holding the catch portion of a connecting element

wherein said catch is situated in the interior of the toy block in a distance from said inner surface, and

at least one of said recess and said through hole is non-circular; and

wherein the toy block connecting elements each comprise a central flat portion with two opposite surfaces and a circumference, and a catch portion for engagement with a catch of the toy block rising from at least one of said surfaces,

wherein at least one of the cross section of catch portion and the circumference of the flat portion is non-circular and said catch portion comprises at least one catch leg, said catch leg comprising at least one engagement means on an outer section of the catch leg opposite said central flat portion.

43. Toy building set comprising

a plurality of toy blocks wherein each toy block comprises two toy block elements for producing a toy block comprising a sidewall with an inner surface and an outer surface intended for abutment against a surface of a corresponding toy block, said sidewall comprising

a through hole for receipt of a catch portion of a connecting element and a recess in said outer surface adjacent the through hole and said each toy block further comprising a catch for engaging and holding the catch portion of a connecting element

wherein said catch is situated in the interior of the toy block in a distance from said inner surface, and

at least one of said recess and said through hole is non-circular;

wherein the toy block elements each comprise a circumferential wall comprising an outer surface, an inner surface and an open edge adapted to be joined with an open edge of a corresponding toy block element, said circumferential wall being cylindrical adjacent the open edge having a generator direction, said wall comprising adjacent its open edge in its outer surface at least one recess, said recess comprising a bottom, and a through hole in said bottom, said hole opening into the open edge, at least one of said recess and said through hole being non-semicircular, said toy block element further comprising at least one first leg portion extending parallel to the generator direction to a level in a vicinity of a level of the open edge to provide at least part of a catch of a toy block and wherein the toy block elements are joined together by their respective open edges, said toy blocks having one or more different outer shapes; and

a plurality of toy block connecting elements,

wherein the toy block connecting elements each comprise a central flat portion with two opposite surfaces and a circumference, and a catch portion for engagement with a catch of the toy block rising from at least one of said surfaces,

wherein at least one of the cross section of catch portion and the circumference of the flat portion is non-circular and said catch portion comprises at least one catch leg, said catch leg comprising at least one engagement means on an outer section of the catch leg opposite said central flat portion.

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