TOY BUILDING SET, CONNECTOR FOR A TOY BUILDING BLOCK, AND TOY BUILDING BLOCK

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ABSTRACT
A toy building set, including a set of building blocks, in at least some of the sides of which there are slots parallel to the sides, in which there is a locking recess and a connector series, including a set of connectors intended to join the building blocks to each other, in which there are arms joined to each other and equipped with tips, and which arms can be fitted into a slot of a building block, the tips fitting into the locking recess, to join the building blocks to each other. The locking recess is a locking slot pair arranged on the bottom of the slot, which is arranged to expand the slot in the direction of the side of the building block and the arms of the connectors are arranged to be formed of rigid legs, at the end of which is the said tip, and a shank connecting the legs to each other.
TOY BUILDING SET, CONNECTOR FOR A TOY BUILDING BLOCK, AND TOY BUILDING BLOCK

[0001] The present invention relates to a toy building set, which includes
[0002] a set of building blocks, in at least some of the sides of which there are slots parallel to the sides, in which slots there is a locking recess and
[0003] a connector series, which includes a set of connectors intended to join the building blocks to each other, in which there are arms joined to each other and equipped with tips, and which arms can be fitted into a slot of a building block, the tips fitting into the locking recess, to join the building blocks to each other.
[0004] In addition, the invention also relates to a connector and a toy building block.
[0005] Several different kinds of three-dimensional toy building sets are known from the prior art. Most of these are plastic, but metal and even wooden building-block systems are also known.
[0006] The connector principles of the toy building sets differ slightly from each other. However, they have in common a joint that is to some extent flexible and based on friction. One such building-block principle is a grooved wooden unit. A detachable connector element can be placed in the groove. This type is known from, among others, Finnish patent number 59930.
[0007] However, a drawback in the toy building set disclosed by the patent in question has been the modest retention, difficult detaching, and the small size of the connectors. The ease of assembly and disassembly of a building set intended for children should be such that it would be as easy as possible to play with it with small hands of limited strength. The block connectors should, however, have sufficient retention to hold the blocks together. Structures made from the blocks can be large in size. Thus, a particular challenge in keeping the construction together comes from the weight of the blocks acting on each other.
[0008] The present invention is intended to create a toy building set, in which the blocks are attached to each other securely, but in which, on the other hand, the blocks and connectors can also be easily detached. The characteristic features of the toy building set according to the invention are stated in claim 1, those of the connector in claim 15, and those of the toy building block in claim 16.
[0009] Arranged on the bottom of the slots of the building blocks of the toy building set according to the invention is a locking slot pair, which is arranged to widen in the direction of the side of the building block while the points of the connectors are arranged to be formed of rigid lugs, which have a tip at their edge, and a narrow shank joining the lugs to each other. Using this combination ensures that the connector and through it also the blocks will be securely and firmly connected, but, on the other hand, also that the connectors can be easily detached from the blocks.
[0010] The locking slot pair can be easily formed in the block, for example, during its manufacture. The locking slot pair need not be a very large formation, as it is not, for example, subject to wear, being protected at the bottom of the slot. Being at the bottom of the slot, the locking slot pair also does not affect the aesthetic appearance of the block.

[0011] The position relative to each other of the locking slot pair and the tip part of the edge of the connector that fits into it can be arranged to be such that they mutually interact to straighten the connector and at the same time connect the building blocks tightly to each other. Thus the blocks can be joined together easily, nor, when joining the blocks together, for example, is there any need to rotate them relative to each other, instead they can be joined by pushing them straight towards each other.
[0012] According to one embodiment, the hub between the slants of the connector, by means of which the connector is arranged to assume a central position in the side of at least one of the building blocks, can be formed from a flat member that is, in at least one direction, thinner at the sides than in the centre, which member will extend into the area of the slot when the connector is fitted into a building block. According to one embodiment, the member can include, on its opposite sides, an end slot running parallel to the edge, which makes the member at least partly hollow. The sides equipped with end slots can additionally be equipped with a cut that halves the side in question and runs towards the centre of the member.
[0013] In addition, the torsion properties of the various parts of the connection can be arranged to be such that while they are easy to bend they are also, on the other hand, sure to return to nearly their original shape and thus form a secure lock with the block. The other characteristic features of the invention will become apparent from the accompanying Claims while more of the other advantages achieved by using the invention are referred to in the description portion.
[0014] The invention, which is in no way restricted to the embodiments described in the following, is examined in greater detail with reference to the accompanying drawings, in which
[0015] FIG. 1 shows end and side views of two building-block models of the system,
[0016] FIG. 2a shows a top view, side cross-section, and end view of a first embodiment of the general connector of the system,
[0017] FIG. 2b shows a top view, side view, and end view of a variation of the first embodiment of the general connector, by means of which the second element to be attached is centred and the counter piece can be placed freely in the direction of the slot,
[0018] FIG. 3a shows a second embodiment of the general connector of the system,
[0019] FIG. 3b shows an end view of the connector according to FIG. 3a,
[0020] FIG. 4a shows a top view, side cross-section, and end view of the connector according to FIGS. 3a and 3b,
[0021] FIG. 4b shows a top view, side cross-section, and end view of a variation of the second embodiment of the general connector, by means of which the second element being attached is centred and the counter piece can be placed freely in the direction of the slot,
[0022] FIG. 5a shows a top view, side view, and end view of a first embodiment of a general connector intended for the lateral attachment of triangular blocks,
[0023] FIG. 5b shows a top view, side view, and end view of a second embodiment of a general connector intended for the lateral attachment of triangular blocks,
[0024] FIG. 6a shows an end view of the operating principle of the general connector according to FIG. 2a,
FIG. 6b shows a side view of the operating principle of the triangular-block connector according to FIG. 5a.

FIG. 7a shows an end view of the operating principle of the general connector according to FIG. 3a.

FIG. 7b shows a side view of the operating principle of the triangular-block connector according to FIG. 5b.

FIG. 8 shows the construction of the intermediate plate of a general connector in the first embodiment, and the principle of detaching the connectors.

FIG. 9 shows the construction of the intermediate plate of the second embodiment of the general connector and the principle of detaching the connectors.

FIG. 10 shows a second example of the bevel shape of the locking grooves.

FIG. 11a shows a variation of the second embodiment of the general connector of the system.

FIG. 11b shows an end view of the connector according to FIG. 11a, and

FIG. 12 shows the attachment of the blocks to each other using a connector according to FIGS. 11a and 11b.

The toy building set according to the invention includes a number of, for example, the building blocks 10.1, 11 shown in FIG. 1 and a set of connectors for the blocks 10.1, 11. The blocks 10.1, 11 are intended for three-dimensional construction and can be manufactured for example, for wood, plastic, or some other suitable raw material. The connector set can include a set of connectors 15.1-15.6 shown in the later figures, intended to connect the building blocks 10.1, 10.2, 11 to each other, and manufactured, for example, from a flexible plastic material.

FIG. 1 shows end and side views of two building-block models 10.1, 11 of the system. The upper part of FIG. 1 shows an example of a rectangular toy building block 10.1 while the lower part of the figure shows an example of a triangular toy building block 11. In at least part of the flat sides 12 of the building blocks 10.1, 11 there are slots 13 running parallel to the sides 12. The slots 13 may cross over each other, though a side equipped with only a single groove is also possible. All the sides 12 of rectangular blocks 10.1 can be equipped with slots 13, as can all the sides 12 of triangular blocks 11 except for the hypotenuse side.

The slots 13 can be made in the blocks 10.1, 11 in a manner that is, as such, known, in which case each corner of the block 10.1, 11 will form a rectangular or triangular corner part equipped with a bevelled or rounded edge, which corner parts are attached to the centre of the block 10.1, 11. In this case, in the corner parts, both the outer edges and also the edges of the opening of the slot 13 are bevelled.

It can be seen from FIG. 1 that at least some of the slots 13 of the as such known grooved building-block element 10.1, 11 can be equipped with a locking recess 14. With the aid of these, the blocks 10.1, 11 are precisely, firmly, and reliably connected to each other. On the other hand, with the aid of the locking recesses 14, the blocks 10.1, 11 can also be easily detached from each other.

In the case according to FIG. 1, the locking recess is a locking slot pair 14 arranged in the bottom 20 of the slot 13 of the block 10.1, 11. It widens the slot 13 in the direction of the side 12 of the building blocks 10.1, 11. The locking grooves 14 can run in a straight line to extend from end to end of the block 10.1, 11, in which case this will cross over each other at the corners of the block 10.1, 11. The locking grooves 14 form a pair of grooves on both sides of the slot 13, at least in the area where these cross each other, which crossover point of the slots 13 is in the centre of the sides 12 of the block 10.1, 11. The locking grooves 14 are on opposite sides of the wall surface of the slots 13, i.e. in this case very close to the bottom 20 of the slot 13. One example of the width V1 of the slots 13 can be 3 mm (or even only 2, 5 mm), its depth 7, 5 mm and the depth of the locking grooves 14 1 mm from the level of the wall of the slot 13, or even less.

FIG. 2a shows a top view of a first embodiment of the general connector 15.1 belonging to the system, a side cross-section (a-b1) in the direction of the longitudinal axis of the connector 15.1, and an end view of it. In the connector 15.1 according to the invention there are rigid arms 18 joined to each other, which, however, flex relative to the central area 23 joining them to each other. The arms 18 are equipped with two tips 19 opposite to each other in the width direction of the connector 15.1. In addition, the tips 19 of the arm 18 can be equipped with at least one bevel 27.

The arms 18 are formed of rigid lugs 21 and a shank 22 connecting the lugs 21 to each other. In the edge of the lugs 21 running in the longitudinal direction of the connector 15.1 there is a tip 19. The tip 19 can be at an angle of 90 degrees, in this case even slightly more. In the case the tip 19 is formed of a bevelled surface 27 and the concave inner side of the arm 18. The concave shape is created by the angle of attachment of the lugs 21 to the shank 22, which in this case is about 145 degrees. The shank 22 too can be flexible to some extent. There can be a step 28 on the back side of the lugs 21, i.e. on the convex side of the arms 18.

The convexness of the arms 18 at the (longitudinal) ends of the connector 15.1 is opposite relative to each other. Thus, when examining the lugs 21 of the arms 18 in the longitudinal direction of the connector 15.1, the alignment of the lugs 21 to the shank 22 is a mirror image. The arms 18 are connected to each other by means of a connector 23 that connects the shanks 22 to each other and permits a rotating flexibility.

According to one embodiment, there may also be a hub 16 between the arms 18. The hub can be formed by a flat member 16 that is thinner than the centre part at the edges in at least one direction, which, when the connector 15.1 is fitted to a building block 10.1, 10.2, 11, extends longitudinally into the area of the slot 13 of the block 10.1, 10.2, 11. The member 16 can also fill the slot 13. According to one embodiment, the hub 16 can be formed of a circular, or alternatively according to FIG. 2b, a semicircular disc 16, 16.1. The hub disc 16, 16.1 that acts as an intermediate plate can be for example, thinner at the edges than in the centre. In addition, the hub 16, 16.1 can be at a slant to the imaginary axial cross-sectional plane of the arms 18 and the connector 15.1. This appears particularly clearly in the cross-section drawing in the right-hand lower corner of FIG. 2a. The radius of the hub 16, 16.1 can be such that it does not extend outside the tip 19 of the lugs 21.

In the arm 18 there can be at least one lightening opening 25, 26. One of its first functions can be to improve the rotational flexing properties of the lugs 21 relative to the shank 22. The lightening openings can be formed of deep longitudinal recesses 25 running deep inside the connector 15.1. The recesses 25, of which there can be two to an arm 18, and which give the lugs a blade-like shape directed towards the hub 16, form together with possible inward curves 26 at the ends of the connector 15.1 a short and narrow shank 22 between the lug 21 and the flexible area of the end of the connector 15.1. By making the recesses 25 deeper, the internal curves 26 of the ends of the connector 15.1 can even be
entirely omitted (FIGS. 4a and 4b). This will improve the rigidity of the lugs 21 and, on the other hand, provide a better finger and thumb grip on them for detaching the connector 15.3, 15.4 from the block. The shank reduces the rigidity of the lug 21 in the longitudinal direction of the connector 15.1 and thus, by permitting rotational flexibility, facilitates the pressing of the connector 15.1 into the slot 13 of the block 10.1. The possible internal curve 26 at both ends of the connector 15.1 for its part permits the easy detaching of the connector 15.1 from the block 10.1, also, for example, using a finger nail as an aid.

[0044] FIG. 2b shows a top view, side view, and end view of a variation of the first embodiment of the general connector, being a connector 15.2 that centres on one side. By means of a connector 15.2 of this kind, one of the building-block elements being attached is centred, while the block that is the counter-piece can be placed freely in the desired location parallel to the side 12 of the block. It can be seen from FIG. 2b that, in the general connector 15.2, the centring, slanting intermediate-plate disc 16.1 can, according to one embodiment, also be halved. Such a disc 16.1 is obtained, if one half of the intermediate plate 16 of the connector 15.1 shown in FIG. 2a is cut off, so that only the semicircular second half remains. The disc 16.1 is then on the same side of the connector 15.2 as the lugs 21 on the longitudinal side.

[0045] On the side of the semicircle 16.1, such a connector 15.2 aligns itself in the centre of the building block, at the intersection of the slots 13 while on the opposite side the building block is permitted to align itself freely parallel to the slot 13. This semicircular disc 16.1 too can be thinner at the edges than in the centre part and, in addition, lie at a slant to the imaginary axial cross-sectional plane of the arms 18. In other words, the implementation of the connector 15.2 can correspond to that of the case shown in FIG. 2a.

[0046] FIGS. 3a and 3b show a side view and an end perspective view of a second embodiment of the general connector 15.3 of the system. The hub 16.2 of the connector 15.3 now has a square shape and its is internally at least partly hollow. In addition, as can be easily seen from FIG. 3a, lightening slots 44 parallel to the edges are cut in the opposite edges of the hub 16.2, so that the hub 16.2 will to some extent collapse on itself when the connector 15.3 is pushed into the slot 13. In addition, in the central part 16.2 there is a lightening cut 45 running towards the centre from its opposite edges, in the middle of the end sides equipped with the slots 44. This too can be clearly seen from FIG. 3a. When attaching blocks to each other, the cut 45 remains between the sides 12 of the blocks and is thus outside the slots 13 of the blocks (FIG. 7a).

If there are, for example, slots 13 of different widths in the blocks it is intended to join to each other, the cut 45, running parallel to the sides equipped with the slots 44 from the edges towards the centre of the intermediate plate 16.2, will surprisingly result in the intermediate plate 16.2 behaving independently relative to each of the blocks. For example, it will then not twist relative to the two blocks, as might otherwise happen.

[0047] As can be seen from FIG. 3a, the opposite sides 42.1 of the square hub 16.2 parallel to the lugs 21 can thin towards the edges of the hub 16.2 that lie against the bottom 20 of the slot 13 in the blocks. From the centre and from the side of the sides equipped with slots 44 the thickness of the intermediate plate 16.2 can even be equivalent to the width of the slot 13, or even greater. A slot 44 that makes the intermediate plate 16.2 hollow in at least part of the direction of its plane allows the intermediate plate 16.2 to even slightly collapse onto itself in the direction of its plane, in which case the intermediate plate 16.2 is pressed tightly into the slots 13 of the blocks. In addition, it facilitates the detaching of the connector 15.3 from the blocks. There is a particular advantage from the intermediate plate 16.2 filling the square slots 13, especially when the connector 15.3 is used to connect several blocks one after the other and through this they must carry a greater structure. The intermediate plate 16.2 will then reinforce the structure and the blocks will better remain, for example, in line with each other. Nevertheless, such a connector 15.3 can still be easily detached from the slot 13 of a block.

[0048] FIG. 4a shows a top view, side cross-section, and an end view of the embodiment shown in FIGS. 3a and 3b. In its basic principles, the connector 15.3 corresponds to the embodiment shown in FIG. 2a, the corresponding point of which will not be reviewed again in greater detail in this connection. However, the internal lightening recesses 25 of the connector 15.3 are now deeper. In addition, at the ends 26 of the connector 15.3 there is no internal lightening curve at all, instead the ends 26 are straight. Nevertheless, the connector 15.3 can be easily detached from a block, as an even better finger-and-thumb grip can be obtained from the lug 21 that is visible at one end of it than from the connector 15.1 equipped with an internal curve 26, and thus the connector 15.3 is detached from the block by pulling on wider blade-like lug 21. The hub 16.2 is at right angle to the longitudinal director of the connector 15.3.

[0049] Now, instead of having a flat shape, the connecting area 23 is slightly rounded (FIG. 4a). The rounding can be arranged to be such that the cross-section of the shank 22 and the connecting area 23 is concave of the side of the lugs 21 of the arms 18 and thus convex on the back side of the arms 18. This further improves the grip of the connector 18 and pulls the blocks that are to be attached to each other even more tightly together. In addition, the rigidity of the connector 15.3 in the longitudinal direction improves and it has also greater torsional rigidity. The curved form of the connecting area 23 also creates an advantage in that, when pulling the connector 15.3 away from the block, the concave side of the connecting area 23 opposes the wall of the slot 13 in the block and due to it the connector 15.3 will easily slide out of the slot 13 in the block. Another advantage achieved by the curved form of the connecting area 23 is that, when detaching the connector 15.3 from a block, it will need to be turned less in the direction of the width of the connector 15.3, so that the tip 19 of the lug inside the block will slide out of the locking recess 14 in the block.

[0050] FIG. 4b shows top, side, and end views of a variation of the second embodiment of the general connector 15.4. The basic principles of the connector 15.4 correspond to the connector 15.3 shown in FIG. 4a. Using such a connector 15.4, the other block element being attached is also centre while the counter piece can be freely positioned in the direction of the slot 13. The lightening recesses 25 now run to different depths on the different sides of the connector 15.4. The lightening recesses 25 on the side with the possible hub plate 16.3 can be deeper than on the side of the connector without the intermediate plate. In this connector 15.4 too, especially in its arms 18, there is no internal lightening curve at all in the extreme longitudinal-direction ends of the connector 15.4, instead the ends 26 of the arms 18 are straight. In addition, the hub disc 16.3 does not now have a circular shape, but instead is in the shape of a rectangle that may be slightly rounded at its corners. In this case, the hub 16.3 is now also at right angles
relative to the longitudinal direction of the connector 15.4. An embodiment entirely without a hub disc is, of course, also possible.

[0051] The toy building set according to the invention can also include triangular blocks 11 according to the lower part of FIG. 1. FIG. 5a shows top, side, and end views of a first variation 15.5 of the general connector, intended for the lateral attachment of triangular blocks 11. In order to attach the triangular blocks 11 to the other triangular blocks of the set, at least some of the connectors 15.5 belonging to the connector series can be equipped with arms 18, to the back side of which guide and alignment studs 29 are fitted.

[0052] With the aid of the studs 29, the triangular blocks 11 can be attached laterally precisely to the other triangular building blocks 11 of the toy building set. Of course, the connector 15.5 can also be used to connect triangular blocks 11, for example, to rectangular blocks 10.1, 10.2 too. The studs 29 can be at one end of the connector 15.5 in the lug 21 and they can have a shape that is short (e.g., 2.5 mm) and slightly conical. The opposite arm 18 can be like that shown in FIG. 2a or 4a.

[0053] In addition, the extreme end of the arm 18 on the stud 29 side of the connector 15.5 in the longitudinal direction can have a rectangular shape. The studs 29 are located at the extreme corners of the lugs 21. As can be seen from FIG. 5a, the connector 15.5 can also be without an actual hub disc 16, 16.1-16.3. In the case according to FIG. 5a, the studs 29 achieve the positioning of the connector 15.5 in the desired manner relative to the side 12 of the block 10.1, 10.2, 11.

[0054] FIG. 5b shows a side and end view of a second variation of the general connector 15.6 intended for the lateral attachment of triangular blocks 11. In it, the guide and alignment studs are slightly longer and thicker than in the embodiment of FIG. 5a. As can be seen from the right-hand end view in FIG. 5b, the studs 29 at the corners of the lugs 21 are now longer in the direction of the width of the connector 15.6 and thus extend on the back side of the lug 21 from the tip 19 to the step 28. This further improves the alignment property of the triangular blocks 11.

[0055] FIG. 6a shows the operating principle of the general connector 15.1 shown in FIG. 2a in the case of rectangular blocks 10.1, 10.2, seen from the end of the connector 15.1 and the blocks 10.1, 10.2. The other connectors of the connector series too are based on this same connection principle. In the toy building set according to the invention, the arms 18 of the connector 15.1 fitted between the blocks 10.1, 10.2 can be fitted into the slot 13 in the sides 12 of the building blocks 10.1, 10.2, in order to attach the blocks 10.1, 10.2 to each other. More particularly, the tip 19 of the arm 18 of the connectors 15.1-15.6 is arranged to settle in place and secure itself to the locking recess 14 in the slot 13 of the block 10.1, 10.2. By means of the hub 16, 16.1-16.3, the connector 15.1-15.4 can be centred in the centre of the side 12 of at least one of the building blocks 10.1, 10.2, 11.

[0056] In the connector 15.1-15.6 according to the invention, the tip 19 of the arm 18 and the locking groove 14 in the slot 13 of the block 10.1, 10.2 are arranged, when attached to each other, to interact in such a way that they straighten the connector 15.1-15.6 and at the same time connect the building blocks 10.1, 10.2, 11 to each other by pulling them tightly together. The straightening effect is also created by the lugs 21 at the opposite corners of the connector 15.1-15.6 being aligned in opposite directions to each other. In order that the connector 15.1 will pull both blocks 10.1, 10.2 tightly against each other, the connector 15.1 must be dimensioned in such a way that empty spaces O, N remain between the connector 15.1 and the bottom 20 of the slot 13 of the block 10.1, 10.2. The space N remains between the end of the lug 21 and the bottom 20 of the block 10.2 while the space O remains between the bevel 27 and the second bevel 14.2 of the locking groove 14 (inset in FIG. 10).

[0057] The retentive capacity of the connector 15.1-15.6 according to the invention is mainly based on the space requirement V (FIG. 2a) of the flexible part 21 of the connector 15.1-15.6 being slightly larger than the slot 13 width V1 (FIG. 1) it requires, plus the expansion created by the locking groove 14 (FIG. 1). Thus a state of slight torsional stress arises in the connection area 23 between the arms 18 of the connector 15.1-15.6, when the connector 15.1-15.6 is pushed into the slot 13 of the block 10.1. The state of torsional stress causes the combined space requirement of the arms 18 at both ends of the connector 15.1-15.6 to increase further.

[0058] When the counter element 10.2 is pushed onto the free half of the connector 15.1-15.6, opposing stresses are created in the flexible areas 22 at the ends of the connector 15.1-15.6. This keeps the joint rigid and in equilibrium at both ends of the connector 15.1-15.6. The flexible area 22 at the ends of the connector 15.1-15.6 also flex to a certain extent.

[0059] FIG. 6b shows a side view of the operating principle of the connector 15.5 for triangular blocks 11. It shows that a conical stud 29 is used to align the connector 15.5 and at the same time the triangular blocks 11, to be attached using it, precisely with each other. In addition, the shape of the stud 29 can be such that it is easy to detach the stud 29 without touching the walls of the slot 13 of the block 11.

[0060] FIG. 7a shows an end view of the operating principle of the general connector 16.3 according to FIG. 3a.

[0061] FIG. 7b shows a side view of the operating principle of triangular-block connector 15.6 shown in FIG. 5b. It shows that the stud 29 can be dimensioned to have a length that extends to the level of the bottom 20 of the slot 13, but not, however, to the slot 13.

[0062] FIG. 8 shows views from different directions of the construction of the intermediate plate 16 of the general connector 15.1 shown in FIG. 2a and of the principle of detaching the connectors. The claw 19 of the connector 15.1 to be set in the locking recess 14 at the bottom of the slot 13 of the block 10.1 pulls the blocks tightly to each other and releases part of the stress created in the connector 15.1. This straightens the connector 15.1 and facilitates pushing it in the slot 13 of the counter block.

[0063] When the blocks are separated by pulling them away from each other, the stress in the connector 15.1 is partly released and when, for example, the nail of the finger or thumb is used to rotate outwards P1 from the outer edge P2 of the curved recess 26 at one end of the connector 15.1 from the block 10.1 with a slanting movement, and towards the centre line P of the block 10.1, the retaining stress vanishes entirely. This causes the connector 15.1 to detach easily from the second arm end and after this it is easy to also detach the second end.

[0064] When the connector 15.1-15.6 is in place in the block 10.1, 10.2, 11, the claws 28 in the back side of the arms 18 correspond to the wall of the slot 13 of the building block 10.1, 10.2, 11, which is the opposite wall to the wall of the locking groove 14 used at that moment in the lug 21 in question. The claw 28 is used to reinforce the grip of the
connector 15.1-15.6 in the block 10.1, 10.2, 11. The step 28 can be, for example, at the boundary between the shank 22 and the lugs 21.

[0065] The operation of the connectors 15.1-15.6 is based on the fact that the surprising positioning of the arms 18 relative to each other in the joint creates a double stress, which holds the blocks 10.1, 10.2, 11 very well together, but, when one block is detached, one arm 18 of the connector 15.1-15.6 can be twisted to remove the stress in the joint entirely, when the connector 15.1-15.6 will detach easily. The connectors 15.1-15.6 are dimensioned to be slightly smaller relative to the depth of the slot 13 (spaces O and N in Fig. 6a), in which case the connectors 15.1-15.6 do not only hold the blocks 10.1, 10.2, 11 together, but surprisingly also pull the blocks 10.1, 10.2, 11 tightly against each other. In other words, half of the width W of the connector 15.1 shown in Fig. 2a can be slightly smaller than the depth of the slots 13 of the building blocks 10.1, 10.2, 11.

[0066] The length L of the connectors 15.1-15.6 (Fig. 2a) can be at most the length of the shorter side 12 of the building block 10.1, 10.2, 11, in other words at most the same as the thickness of the block 10.1, 10.2, 11. One example of the length of the length L of the connector is 24 mm, the length of the shorter side 12 of the block 10.1, 10.2, 11 being 30 mm. Correspondingly, the length of the longer side 12 of the block 10.1, 10.2, 11 can be, for example, 45 mm. The thickness of the connector 15.1-15.6 in the flexing direction V (Fig. 2a) can be greater than the distance between the opposing locking recesses 14 of the slot 13 of the building block 10.1, 10.2, 11, of which an example has already been given earlier in the description. One example of the thickness V of the connector 15.1-15.6 can be 3 mm.

[0067] A bevel 27 of, for example, 45 degrees, is arranged in the tip 19 of the arm 18 for the locking groove 14. In addition, the bevel 27 in the tip 19 of the arm 18 of the connector 15.1 facilitates the initial stages of pushing the connector 15.1 into the slot 13 of the block 10.1, 10.2, 11, as it makes contact with the contact surface, which can also be at 45 degrees for example, of the counter bevels 33 in the opening of the slots 13 of the block 10.1.

[0068] FIG. 9 shows the construction of the hub centre plate 16.2 of a second general-connector embodiment 15.4, as well as the principle of detachment the connectors 15.3. In this case, the edges 33 of the blocks 10.1 are not bevelled, but rounded. It is now possible to get a good thumb grip P1, P2 on the lugs 21, because there is no internal curve 26 in the ends, thus making it possible to get a better grip on the leg 21.

[0069] FIG. 10 shows a second embodiment of the bevels 14.1, 14.2 of the grooves 14 forming the locking slot pair. In this case, the bevel 14.2 closer to the bottom 20 of the slot 13 is steeper relative to the bevel 14.1 that is farther from the bottom 20 of the slot 13. Due to this feature, the connector 15.1-15.6 according to the invention as it were 'snaps' the blocks even more strongly to each other, and thus does not simply provide a force that holds the blocks together. In addition, wood could live over time, so that the bevels 14.1, 14.2 that differ from each other also provide a retentive solution to the problem caused by the possible living of the wood. The inset in FIG. 10 shows the steepness of the bevels 14.1, 14.2 of the grooves 14. It is obvious that groove bevels 14.1, 14.2 with such steepness can be applied in any of the blocks 10.1, 10.2, 11 and in the case of any of the connectors 15.1-15.6 according to the invention.

[0070] FIGS. 11a and 11b show yet another variation of the connector shown in FIGS. 3a and 3b. In this case, the hub 16.2 of the connector 15.3 is square in shape, but parts have been cut off its corners. In other ways, the connector 15.3 corresponds to those shown in FIGS. 3a and 3b. The cut has been made in such a way that straight part of each side of the square 16.2 will be of the same dimension.

[0071] FIG. 12 shows blocks being attached to each other using a connector 15.3 according to FIGS. 11a and 11b. As can be seen from the figure, when the connectors 15.3 are on all sides of the block 10.2, the cut corners of their hubs 16.2 lie against each other and thus permit the blocks 10.1, 10.2 to be attached to each other in the arrangement shown. The cut corners of the hubs 16.2 of the connectors 15.3 permit two blocks 10.1 to be attached to the adjacent longer sides of the corner block 10.2. The connector embodiment described above, the hubs of which are squares, do not permit a connection of this kind.

[0072] The connectors 15.1-15.6 according to the invention can be manufactured, for example, using the injection-moulding technique.

[0073] It must be understood that the above description and the related figures are only intended to illustrate the present invention. The invention is thus in no way restricted to only the embodiments disclosed or stated in the Claims, but many different variations and adaptations of the invention, which are possible within the scope on the inventive idea defined in the accompanying Claims, will be obvious to one versed in the art.

1.15. (canceled)

16. Toy building set, which includes a set of building blocks, in at least some of the sides of which there are rectangular slots parallel to the sides, in which there is a locking recess and a connector series, which includes a set of connectors intended to join the building blocks to each other, in which there are arms joined to each other and equipped with tips, and which arms can be fitted into a rectangular slot of a building block, the tips fitting into the locking recess, to join the building blocks to each other, wherein the said locking recess is a locking slot pair arranged on the bottom of the rectangular slot, which is arranged to expand the rectangular slot in the direction of the side of the building block and the arms of the connectors are arranged to be formed of rigid lugs, at the end of which is the said tip, and a shank connecting the lugs to each other.

17. Toy building set according to claim 16, wherein, of the bevels of the grooves of the locking slot pair, the bevel that is closer to the bottom of the slot is steeper than the bevel that is farther from the bottom of the slot.

18. Toy building set according to claim 16, wherein the fitting of the tip of the arm to the locking groove is arranged to straighten the connector and to connect the building blocks tightly together.

19. Toy building set according to claim 16 in which a hub is arranged between the arms, by means of which the connector is arranged to be centred in the centre of a side of at least one of the building blocks, wherein the hub is arranged to be formed of a flat element that is at least one direction thinner at the edges than in the centre part, which, when the connector is fitted to a building block extends in the area of the slot.

20. Toy building set according to claim 19, wherein, in the member an end slot cut making the member at least partly
21. Toy building set according to claim 20, wherein the member is arranged to be a square, from each corner of which a piece is cut off.

22. Toy building set according to claim 16, wherein the arms are connected to each other by means of a joint joining the shanks to each other and permitting rotational flexibility.

23. Toy building set according to claim 16, wherein a lightening is arranged in the arm, in order to improve the rotational flexibility properties of the lugs.

24. Toy building set according to claim 16, wherein the arms are straight at the ends of the connector.

25. Toy building set according to claim 16, wherein, in the arm, there is a bevel arranged in the tip for the locking groove, and a step arranged on the back side of the lug, which is arranged to correspond to the wall of the slot of the building block.

26. Toy building set according to claim 16, wherein connector's half width is less than the depth of the slots in the building blocks.

length is at most the same as the length of the shorter side of the building block, and thickness in the flexing direction is greater than the distance between the opposing locking recesses of the slot of the building block.

27. Toy building set according to claim 16, the building blocks of which includes, in addition, triangular blocks, wherein at least some of the connectors belonging to the connector series are equipped with arms, on the back side of which are arranged guiding and alignment members for the lateral attachment of the triangular blocks to the other building blocks of the toy building set.

28. Toy building set according to claim 16, wherein the joint of the arms is rounded, in such a way that the cross-sectional profile of the joint area is concave on the side of the lugs of the arms.

29. Connector for joining the toy building blocks together, in at least some of the sides of which toy building blocks there are rectangular slots running parallel to the sides, in which there is a locking recess and in which connector there are arms connected to each other and equipped with tips, and when attaching the connector to a toy building block the arms are arrangeable into the rectangular slot of the toy building block and the tips are arranged to settle into a locking recess arranged in the rectangular slot of the toy building block, wherein, the arms are arranged to be formed of rigid lugs, at the end of which is the said tip and a shank connecting the lugs to each other.

30. Toy building block, at least some of the sides of which are equipped with rectangular slots running parallel to the sides, in which there is a locking recess, wherein the said locking recess is a locking slot pair arranged on the bottom of the rectangular slot, which is arranged to expand the slot in the direction of the side of the building block.

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