

[54] **BLOCKS WITH DETACHABLE CAP  
PLATES HAVING ADDITIONAL MATING  
CONNECTING MEANS**

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[51] Int. Cl. .... A63h 33/08, A63h 33/10

[58] Field of Search ..... 46/25, 31, 16, 17

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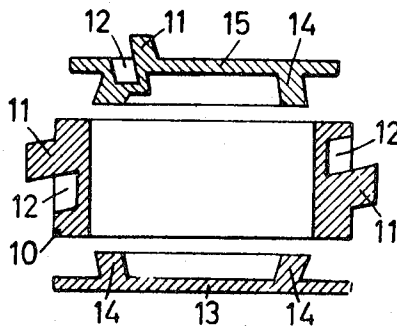
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[57] **ABSTRACT**

Construction elements, particularly for use in the construction of toys for block-by-block engagement with each other, wherein the elements comprise a closed frame having grooved outer surfaces and tongue-like connector elements sloped with respect to the plane of the frame, and wherein the open sides are capable of being covered by respective cap plates with or without connector elements.

**5 Claims, 12 Drawing Figures**



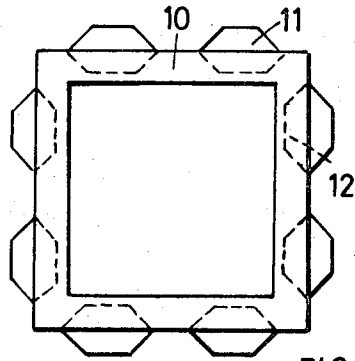


FIG. 1.

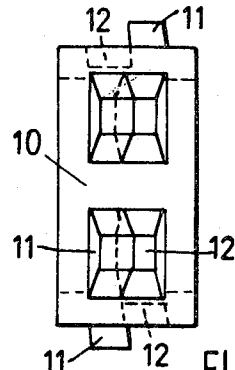


FIG. 2.

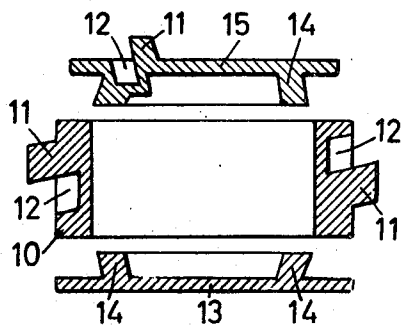


FIG. 3.

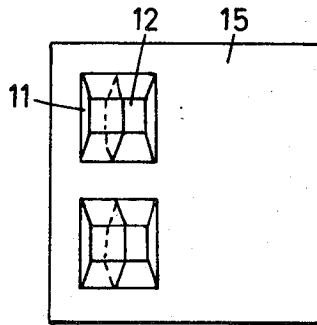


FIG. 4.

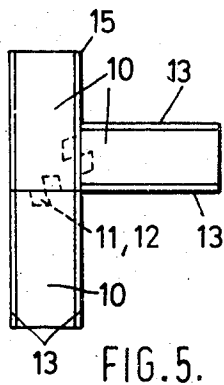


FIG. 5.

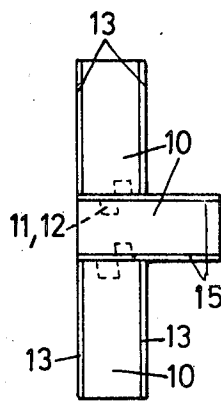


FIG. 6.

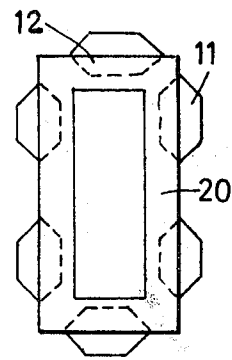


FIG. 7.

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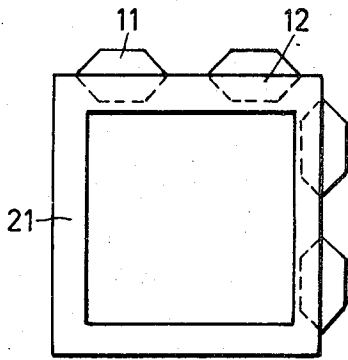


FIG. 8.

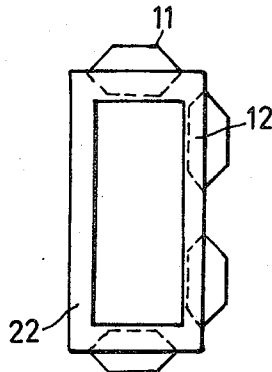


FIG. 9.

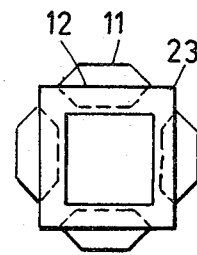


FIG. 10.

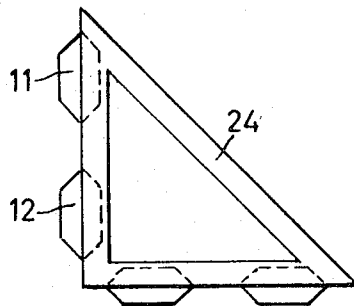


FIG. 11.

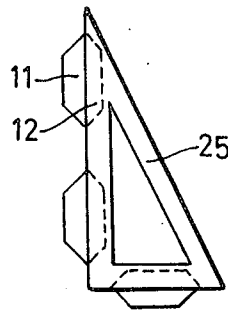


FIG. 12.

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**BLOCKS WITH DETACHABLE CAP PLATES  
HAVING ADDITIONAL MATING CONNECTING  
MEANS**

This invention relates to construction elements, particularly for use in toy constructions or building constructions, which are blockable up by engagement with each other by means of connector elements preferably of the tongue and groove type.

A plurality of boxes of children's bricks for use as toys are known, which use construction elements blockable up by engagement with each other by means of connector elements, which latter preferably are of the tongue and groove type. These so-called "plug-bricks" on two opposing surfaces are provided with connector elements of a plug or clamp joint. Thus one of the surfaces can be provided with groove-like plug or clamp receiving excavations and the other surface with tongue-like plugs. The cross-section of these receiving excavations and plugs can be of various configuration and the arrangement and distribution of these connector elements is chosen so as to enable the construction elements to be connected with each other in predetermined relations with respect to each other.

The known construction elements of the prior art generally have on at least two outer sides (mostly opposing each other) plug elements so that they can be assembled in two directions only to a standing wall. If all four sides have plug elements, the construction elements which are juxtaposed in the erected wall are also joined with each other. All joints are in the wall, however, that is, they cannot be seen from the front and the rear of the wall. With these construction elements it is possible to join two vertical walls in a right angle and to build them up, but it is not possible to attach a horizontal wall to the vertical wall and to join these two walls together. Thus, such elements preclude building a horizontal branch, such as for a floor or ceiling.

There have already been made attempts to remedy this deficiency by producing construction elements which bear connector elements on more than two surfaces in order to provide a third blocking up direction. Since these construction elements cannot always be used for normal walls, in the formation at those spots of a horizontal branch these special construction elements have to be used. Since these special construction elements are integrated in the formation of normal construction elements, the horizontal branches in model construction have to be exactly predetermined. In toy construction of models this, however, is not possible. It often happens that with advancing erection of a model subsequently on spots already completed in their blocked up formation such a horizontal branch is desired. Attaching of such a horizontal branch construction with the known construction elements only is possible if the model construction formation is detached down to this spot.

Similar situations occur in the technique of erection of buildings with prefabricated construction elements, which in most cases are plate-like and are connected with each other by inter-engagement by means of groove- and -tongue connections. Additionally the juncture spots or lines, respectively, have to be filled up with and closed by binders. With this construction element there is no possibility to branch off horizontally from vertical walls.

It is an object of the invention to improve construction elements, particularly for use in toy constructions and building constructions, which are blockable up by engagement with each other by means of connector elements preferably of the tongue and groove type so as to enable on any spot of a blocked up formation of such construction elements the branching off of a vertical or horizontal branch-construction with further construction elements and to provide for a possibility for this branch-construction to be altered or varied or modified in any desired way in the completed model without the need of detaching said model. A further object of the invention is simultaneously to improve the interconnection of the construction elements of a formation so as to ameliorate the statical transmission of forces between the construction elements and to provide for sort of interlocking latch of the construction elements in their formation.

According to the invention construction elements, particularly for use in toy constructions or building constructions, which are blockable up by engagement with each other by means of connector elements preferably of the tongue and groove type, each comprise a closed frame, the outer surfaces of which are provided with groove- and -tongue-like connector elements sloped with respect to the plane of said frame and the open sides of which are capable of being covered by respective cap plates with or without connector elements. This division of construction elements into several parts to be attached together yields the advantage that for all construction erection directions there can be used the same frames and that by means of the cap plates attachable at any time desired there can be determined whether there is desired or is not desired a branching off in this region of a frame. If no branching off construction is intended, a cap plate plane on one surface thereof is used for closing the frame. If a cap plate with connector elements is used, then according to the relative position of the cap plate with respect to the frame a vertical or horizontal branching off in the region of the frame can be chosen. It is readily conceivable that by exchange of the cap plates on any desired spot of a ready erected construction the capability of blocking up in any desired branching-off direction can be modified subsequently without interfering with the formation of the already blocked up frame. The slope of the connector elements with respect to the plane of the frame yields an improved transmission of forces and an interlocking of the frames within the total formation, if the frames are placed in the formation with exchange of their connector elements with respect to the open frame sides.

According to a preferred embodiment of the invention the connector elements are arranged so that the groove- and-tongue-like connector elements have a trapezoidal cross-section in the plane of the frame, the groove-like connector element tapering to the interior and the tongue-like connector elements tapering to the exterior of the frame. According to a further improvement of the invention preferably in connection with this embodiment there can be arranged one groove-like and one tongue-like connector element adjacent each other as a pair of connector elements offset or shifted, respectively, in the plane of the frame.

In order that the construction elements be blocked up in a relation to each other shifted for only half of their pitch, there is on one basic length or side of the

frame two pairs of connector elements dividing the basic length of the frame in the ratio 1:2:1. Thus, the distances of the center axes of the connector elements from each other and from the ends of the outer surfaces are arranged in such a ratio.

Improved blocking up possibilities with absolute latching of the construction elements within their formation can be yielded by arrangement of the connector elements on the outer surfaces of the frame with all groove-like connector elements directed to one of the open sides of the frame and all tongue-like connector elements directed to the other open side of the frame. This preferred embodiment of the invention can still be improved by arrangement of the groove- and -tongue-like connector elements on the various outer surfaces of the frame with different or varied allotment with respect to the open sides of the frame. As a still further variant there can be provided an arrangement of the groove- and -tongue-like connector elements of one outer surface of the frame with different or varied allotment with respect to the open sides of the frame.

Neat wall closings can be attained if part of the outer surfaces of the frame is plain and without connector elements.

The variety of possibilities with respect to a plane blockable up can be engrossed remarkably by additional constructional elements of different configurations and size. If there is used as a basic constructional element a frame of square configuration with the basic length as its square side length, then the additional constructional elements are to be tuned to this basic frame length, on each basic length accommodating two pairs of groove- and -tongue-like connector elements arranged adjacent each other so as again to divide this side of the construction element in the ratio 1:2:1. As an additional constructional element for instance there can be provided a frame of rectangular configuration with the basic length and half of same as its rectangle side length. As a further additional constructional element according to the invention there can be used a frame of square configuration with half of the basic length as its square side length. Still further additional constructional elements according to the invention are provided by frames with rectangular configuration or the configuration of parallelograms and trapezoids, as will be shown later in the detailed description of the embodiments of the invention.

According to a still improved further embodiment of the invention the interconnection of the cap plates and the frame can be achieved by the cap plates on their one side being provided with locking means which engage with the free interior of the frame. The connector elements are arranged on the outside surface of the cap plates, said outside surface of a cap plate preferably being provided with pairs of connector elements.

For construction elements for use in toy constructions with the best advantage the frames and cap plates in their different configurations and sizes are preferred to be produced by injection moulding of synthetic material.

For construction elements for use in building constructions with accordingly larger frames and cap plates there is advisable a production from synthetic-bound mineral material, which yield the ruggedness and strength necessary for building constructions already with comparatively small volume. It has surprisingly proved that one cap plate and half of the frame

can be produced as one integral member capable of being engaged with another similar member so as to form an entire construction element according to the invention.

In order that the invention may be fully and clearly comprehended the same will now be described by way of example with reference to the accompanying drawings, wherein:

FIG. 1 is a side elevation of a frame of a basic constructional element according to the invention with the basic length facing the open side of the frame.

FIG. 2 is a lateral elevational view of the frame according to FIG. 1 facing one of the outer surfaces of the frame.

FIG. 3 is a sectional elevation of the frame according to FIGS. 1 and 2 and its associated cap plates.

FIG. 4 is a plan view onto the outer surface of a cap plate provided with connector elements.

FIG. 5 is a blocking up pattern showing the use of a plurality of construction elements according to FIGS. 1 through 4 with a horizontal branch-off.

FIG. 6 is another blocking up pattern showing the use of the construction elements according to FIGS. 1 through 4 for the achievement of a keyed horizontal branch-off.

FIG. 7 is a side elevation of the frame of a first additional constructional element according to the invention.

FIG. 8 is a side elevation of the frame of a basic constructional element according to the invention with the outer surfaces of the frame.

FIG. 9 is a side elevation of the frame of another additional constructional element according to the invention with rectangular configuration.

FIG. 10 is a side elevation of the frame of a still further additional constructional element according to the invention with square configuration with smaller square side lengths.

FIG. 11 is a side elevation of the frame of still another additional constructional element according to the invention with a configuration of a triangle with two equal sides perpendicular to each other.

FIG. 12 is a side elevation of the frame of still another additional constructional element according to the invention with a configuration of a triangle with two sides perpendicular to each other.

Referring now to FIGS. 1 to 3 of the drawings, the basic constructional element consists of a frame 10 of square configuration, on the four outer surfaces of which there are disposed groove- and -tongue-like connector elements 11 and 12 in a distribution of pairs of same. In the plane of the frame 10 these connector elements 11 and 12 are of trapezoidal configuration, the tongue-like connector elements 11 extending from the outer surface of the frame in a tapering manner and the groove-like connector elements 12 penetrating into the frame in a tapering manner as well. As can be seen particularly from the lateral elevation of FIG. 2 and the cross-section of FIG. 3, the connector elements 11 and 12 are arranged with a slope with respect to the plane of the frame so as to provide for the direction of assembly of the construction elements to be sloped with respect to the direction of erecting the construction accordingly. This achieves an interlocking of the construction elements in their formation, and this particularly if the connector elements 11 and 12 are engaged to the open sides of the frame.

As is shown in FIG. 2 of the drawings, the two pairs of connector elements are disposed so as to divide the frame side with two portions of connector element for each portion of frame side. Thus there is enabled the blocking up of the construction elements of the invention shifted along the length of the construction elements. The pairs of connector elements may be disposed on the various outer surfaces of the frame with equal or staggered spacing with respect to the open sides of the frame. The two pairs of connector elements of one outer surface of the frame may be arranged in exchanged relation to each other, too. The open sides of the frame 10 are closed by the cap plates 13 and 15. On their side destined to be brought into facing relationship with the frame 10 the cap plates 13 and 15 are provided with locking means in the form of sloping latch elements 14, which engage with the hollow interior of the frame 10. The cap plate 13 neatly covers the associated open side of the frame 10 and flushes with its outer surfaces, whereas the cap plate 15 along one side thereof is provided with a pair of connector elements of its own, as can be seen particularly from FIG. 4. This cap plate 15 thus is capable to directly receive the pairs of connector elements 11, 12 of one facing side of a frame 10 so as to enable the attachment of new frames 10 in horizontal or vertical direction with respect to the frame 10 associated to said cap plate 15 according to the latching relation of said cap plate 15 on its associated frame 10.

With reference to FIGS. 5 and 6 there is explained the construction pattern with the new construction elements in detail. The two vertical frames 10 each are closed by neat cap plates 13 on their lefthand side. The lower vertical frame 10 on its righthand side is closed by a neat cap plate 3 aswell. The righthand side of the upper vertical frame 10 is closed by a cap plate 15, which is provided with pairs of connector elements 11, 12 along its lower side edge. Both the vertical frames 10 are interlocked with each other directly by the pairs of connector elements 11, 12 of their outer surfaces abutting each other. The horizontal frame 10 covered by cap plates 13 can be interlocked directly with the cap plate 15 by means of the pairs of connector elements 11, 12 of its left side outer surface. Thus at any desired spot of the formation of construction elements with the same construction elements there can be erected construction branching off horizontally.

In the keyed branch-off according to FIG. 6 both open sides of the horizontal frame 10 are covered by cap plates 15 with pairs of connector elements 11, 12. This frame thus can be blocked in directly between two vertical frames 10, all the open frame sides of which then are covered by cap plates 13. Since the horizontal frame 10 is arranged in the formation of the vertical construction elements so as to lie with one of its outer surfaces flushing with the vertical frames 10, it is of advantage if this outer surface of this horizontal frame 10 is not provided with connector elements. To a kit of construction elements accordingly there also belong frames, part of the outer surfaces of which are neat and without connector elements.

In FIG. 7 there is shown a first additional constructional element, the so-called "half-brick." The frame 20 and an associated cap plate are of rectangular configuration with the basic length and half of same as its rectangle side length. On its smaller side surface there is arranged only one pair of connector elements 11, 12

in centered relation, whereas the longer side faces each are provided with two pairs of connector elements in the disposition ratio 1:2:1 already mentioned.

In FIG. 8 there is shown a basic construction element the frame 21 of which on two of its outer frame sides is free of connector elements. This modified basic construction element can be closed by cap plates 13 or 15 aswell. The same applies to the modified frame 22 of a "half-brick" according to FIG. 9, which bears connector elements merely on three of its outer side faces and is capable to be covered by "half-caps" like the "half-brick" according to FIG. 7. FIGS. 8 and 9 are illustrative of "partly neat" outer surfaces as this term is used herein means that not all outer surfaces are provided with connector or plug elements in the frame-type construction element. These elements are for applications, such as corners where plane sides are required.

In FIG. 10 there is shown a so-called "quarter-brick," the sides of which correspond to half of the basic length and each are provided with only one pair of connector elements 11, 12 in centered relation.

The frame 24 according to FIG. 11 has the configuration of a right-angled triangle, the length of the short sides of which correspond to the basic length and each are provided with two pairs of connector elements 11, 12. The face of the hypotenuse of the frame 24 is neat. The frame 25 according to FIG. 12 likewise has the configuration of a right-angled triangle. The length of the longer one of its smaller sides corresponds to the basic length and is provided with two pairs of connector elements 11, 12, whereas the shorter one of its smaller sides is of half the basic length only and bears one pair of connector elements 11, 12 in centered relation.

As additional constructional elements according to the invention there also can be used frames with a configuration of an oblong parallelogram or a trapezoid, in which again and again the lengths of their sides are chosen in accordance with the basic length and half of same.

These various modified frames accordingly designed cap plates with or without pairs of connector elements are associated to.

Small construction elements for toy-construction-kits preferably are made by injection moulding of synthetic material, whereas large construction elements for the erection of buildings or dwellings or the like for reasons of ruggedness and strength are manufactured from synthetic-bound mineral material. Preferably for such construction elements for the arrangement of housings or the like it has proved advantageous to produce such construction elements so as to enable one cap plate and half of the frame to be one integral member capable of being engaged with another similar member so as to form an entire construction element.

What is claimed is:

1. An interlocking construction element for use in building vertically and horizontally comprising: a closed frame having a plurality of sides one of which defines a basic length and opposite open ends, at least one said end having its surface lying in a plane; connector means for coacting with similar connector means of a similar element, said connector means including a tongue and groove integrally formed on at least one of the sides of said frame and projecting in planes inclined with respect to said planar surface of said frame; said

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tongue and groove each having a trapezoidal cross-section, said connector means being arranged in a regular manner on said side to correspond with said basic side length; at least one of the open ends of said frame being covered by a cap plate detachably engageable therewith by means of locking means on one major surface thereof in the form of sloping latch elements frictionally engageable with the interior side surfaces of said open frame, said cap plate having, on its surface opposite said one major surface, connector means for mating with said connector means of said construction element to connect one of said construction elements thereto.

2. The construction element according to claim 1, wherein said connector means arranged on said side of the frame form two of said tongues and grooves dividing the basic length of the frame in the ratio 1:2:1.

3. The construction element according to claim 2,

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wherein said construction element is a frame of rectangular configuration with the basic length representing the long sides and half of the basic length representing the other shorter side length; and connector means provided on said shorter sides being centered with respect thereto.

4. The construction element according to claim 1, wherein said construction element is a frame of parallelogram configuration, at least one pair of opposing sides of which is of a length corresponding to the basic length.

5. The construction element according to claim 1, wherein one said groove and one said tongue of said connector means are disposed adjacent to each other on said side as a pair of mutually offset elements disposed parallel to each other and extending in a direction away from each other.

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