

[Title of Document] DESCRIPTION

[Title of the Invention] CONNECTABLE BLOCK

[Technical Field]

[0001]

The present invention relates to blocks connectable to each other to form various three-dimensional shapes by preparing a number of such blocks and repeating the operation of fitting protrusions provided on the surface of one block into recessed portions provided in the surface of the other blocks.

[Background Art]

[0002]

Blocks connectable to each other to form various three-dimensional shapes are widely known such as disclosed in Patent Document 1 below, in which multiple (e.g. four to eight) protrusions are formed on the top surface of a rectangular parallelepiped block and recessed portions into which the respective protrusions are fittable are formed in the bottom surface parallel to the top surface.

[Related Art Document]

[Patent Document]

[0003]

[Patent Document 1] Japanese Translation of PCT International Application No. 2002-534240

[Summary of the Invention]

[Problems to be Solved by the Invention]

[0004]

The block disclosed in Patent Document 1 above, in which multiple protrusions are merely formed on the top surface, is easy to stack and connect without thinking and does not require any significant thought process, lacking in intellectual training and game elements.

Neither protrusion nor recessed portion is formed on the side surfaces, which makes it difficult to obtain various connection states.

There have also been proposed other types of blocks having protrusions and recessed portions formed on the side surfaces thereof, but having multiple protrusions formed on the top surface or even one protrusion at the center of the top surface, with which simple connection structures can be obtained but complex connection structures requiring a thought process cannot be obtained easily. All such blocks are thus lacking in intellectual training and game elements.

It is hence an object of the present invention to provide a block having a simple shape by itself with which various three-dimensional structures can be obtained by devising connection states.

[Means for Solving the Problems]

[0004a] According to one aspect, there is provided a regular hexahedral block (B) connectable with at least another block by fitting a protrusion provided on a surface of one of the blocks into a recessed portion provided in a surface of the other block, wherein a protrusion (B11) for connecting the regular hexahedral block to another regular hexahedral block is formed on a first surface (B1) of the regular hexahedral block at the center of one quarter section of the first surface, three recessed portions (B12, B13, B14) are formed at the center of the three quarter section of the first surface of the regular hexahedral block where the protrusion is not formed, and at least one further recessed portion (B21, B41, B51, B61) is provided at the center of one quarter section of each of the second, fourth, fifth and sixth surfaces (B2, B4, B5, B6) of the regular hexahedral block perpendicular to the first surface and at least one further recessed portion (B31) is provided at the center of one quarter section of the third surface (B3) of the regular hexahedral block parallel to the first surface.

[0005]

Exemplary embodiments are directed to a hexahedral block connectable with at least another block by fitting a protrusion provided on a surface of one of the blocks into a recessed portion provided in a surface of the other block, in which one protrusion is formed on at least one surface of the hexahedron at a position displaced from the center of the surface, and in which at least one

recessed portion is formed in at least another surface of the hexahedron at a position displaced from the center of the surface.

The hexahedron may be a regular hexahedron.

The protrusion may be provided at the center in one quarter section of one of the six surfaces, and the recessed portion is provided at the center in one quarter section of at least one of the other five surfaces.

The at least one recessed portion may be provided in each of the other five surfaces.

The recessed portion may be provided at the center in each of two quarter sections of the one surface.

The recessed portion may be provided at the center in each of three quarter sections of the one surface.

The recessed portion may be provided at the center

in each of four quarter sections of the one surface.

The protrusion may have a square cross-sectional shape, and the recessed portion may include four inner wall surfaces and may have a cross-sectional shape into which the protrusion is fittable.

A rib may be formed on at least one of the inner wall surfaces of the recessed portion.

[Advantageous Effects of the Invention]

[0006]

In accordance with the connectable block according to the present invention, at least one surface of the hexahedron has only one protrusion formed thereon, which requires a profound spatial thought process to obtain complex three-dimensional structures, exhibiting a beneficial effect on spatial recognition and intellectual training. In addition, since the one protrusion is formed at a position displaced from the center of the surface, various connection structures can be obtained depending on into which recessed portion of another block to fit the protrusion.

The connectable block according to the present invention thus requires a thought process for profound spatial recognition to obtain various three-dimensional shapes, providing good intellectual training and game elements.

In addition, since recessed portions are formed also in the side surfaces, various connection states can be obtained.

The present invention thus provides a connectable block having a simple shape by itself with which various three-dimensional structures can be obtained by devising connection states.

[Brief Description of the Drawings]

[0007]

FIG. 1 is a perspective view of a connectable block according to the present invention.

FIG. 2 is a perspective view of a connectable block according to a first embodiment.

FIG. 3 is a plan view of the connectable block according to the first embodiment.

FIG. 4 illustrates connection structures of the connectable block according to the first embodiment.

FIG. 5 illustrates connection structures of the connectable block according to the first embodiment.

FIG. 6 illustrates connection structures of the connectable block according to the first embodiment.

FIG. 7 shows perspective views of various exemplary connection structures obtained by connecting connectable blocks according to the first embodiment.

FIG. 8 shows perspective views of various exemplary connection structures obtained by connecting connectable blocks according to the first embodiment.

FIG. 9 is a perspective view of a connectable block according to a second embodiment.

FIG. 10 is a perspective view of a connectable block according to a third embodiment.

FIG. 11 is a perspective view of a connectable block according to a fourth embodiment.

[Modes for Carrying Out the Invention]

[0008]

Connectable blocks according to preferred embodiments of the present invention will hereinafter be described with reference to the accompanying drawings.

[0009]

FIG. 1 shows a hexahedral block A according to the present invention, connectable with at least another block by fitting a protrusion provided on a surface of one of the blocks into a recessed portion provided in a surface of the other block. In this figure, the top surface is defined as a first surface A1, the side surface to the immediate right of the first surface A1 is defined as a second surface A2, the bottom surface is defined as a third surface A3, the side surface to the immediate

left of the first surface A1 is defined as a fourth surface A4, the front surface is defined as a fifth surface A5, and the back surface is defined as a sixth surface A6.

[0010]

Among the six surfaces, at least the first surface A1 has a protrusion A11 formed thereon, and at least the second surface A2, one of the other five surfaces, has a recessed portion A21 formed therein.

The protrusion A11 is formed at a position displaced from the center of the first surface A1, and the recessed portion A21 is also formed at a position displaced from the center of the second surface A2.

The protrusion A11 has a columnar (e.g. square) cross-sectional shape, and the recessed portion A21 has a shape and size into which the protrusion A11 is fittable.

[0011]

The hexahedron A is preferably, but may not be, a regular hexahedron. Two adjacent surfaces are preferably orthogonal to each other to assemble regular solids, but may not be orthogonal.

Only one protrusion may be formed on at least one of the six surfaces. Alternatively, two or more protrusions may be formed on one or two or more surfaces.

[0012]

One, two, three, or four protrusions may be formed on the first surface A1. In the case of two, the protrusions are preferably provided diagonally on the surface, but may be arranged adjacently. In the case of three or fewer protrusions, a recessed portion may or may not be formed.

[0013]

One, two, three, or four recessed portions A21 may be formed in the second surface A2. In the case of two, the recessed portions are preferably provided diagonally in the surface, but may be arranged adjacently. In the case of three or fewer recessed portions, a protrusion may or may not be formed.

[0014]

If both at least one protrusion and at least one recessed portion are formed on one surface and in the case of one protrusion, one, two, or three recessed portions may be formed. In the case of two protrusions, one or two recessed portions may be formed. In the case of three protrusions, one recessed portion may be formed.

[First Embodiment]

[0015]

A block according to a first embodiment of the present invention will hereinafter be described with reference to FIGs.

2 and 3.

The block B according to the first embodiment is a regular hexahedral one, in which a protrusion B11 is provided at the center in one quarter section (quartered along the dashed lines shown in FIG. 3) of a first surface B1, one of the six surfaces, while recessed portions B12, B13, and B14 having a size into which a protrusion having the same shape and size as the protrusion B11 and formed on another block having the same shape is fittable are provided at the center in the other three quarter sections.

In each of the other five surfaces, recessed portions having a size into which the protrusion is fittable are provided at the center in two or four quarter sections.

The block B may be composed of any selective material such as PP resin or ABS resin.

[0016]

The protrusion A11 is a quadrangular columnar one having a square cross-sectional shape, and the recessed portions B12, B13, and B14 have a shape and size into which the protrusion A11 can be inserted. It is noted that the ratio of the height of the protrusion A11 to the length of each side of the block B is not limited to the example shown but may be smaller.

The recessed portion B12 includes four inner wall surfaces,

and two lines of ribs B15 and B16 are formed on each of adjacent two of the four inner wall surfaces and the bottom surface of the recessed portion.

Therefore, the recessed portion B12 is formed wider by the height of the ribs B15 and B16. These ribs B15 and B16 cause the protrusion to be inserted and fitted tightly into the recessed portion B12, preventing excessive looseness or excessive tightness making it difficult to attach or detach the protrusion. The other recessed portions B13 and B14 are arranged in the same manner as the recessed portion B12.

In the case of blocks including no rib, the recessed portions have a shape and size into which the protrusion is just fittable.

[0017]

FIG. 4 illustrates cases of stacking and connecting two such blocks B as arranged above. Depending on into which one of the four recessed portions in the upper block to fit the protrusion on the lower block in FIG. 4(A), various connection states can be obtained such as aligned shown in FIG. 4(B) and misaligned shown in FIGS. 4(C), 4(D), and 4(E).

Four types of different connection states can thus be obtained and, by combining these states, various types of connection structures can also be obtained.

[0018]

FIG. 5 illustrates a case of connecting two such blocks B as arranged above in such a manner as to redirect the protrusion. Depending on into which recessed portion in which surface of the left block to fit the protrusion on the right block in FIG. 5(A), a connection state redirecting the protrusion can be obtained as shown in FIG. 5(B), for example.

Connection states redirecting the protrusion can thus be obtained and, by combining these states, various types of connection structures can also be obtained.

[0019]

FIG. 6 illustrates a case of connecting two such blocks B as arranged above in such a manner as to hide the protrusions. As shown in FIG. 6, a connection state hiding the protrusions can be obtained by fitting the protrusion on the left block into the recessed portion in the right block and fitting the protrusion on the right block into the recessed portion in the left block.

As exemplified in FIGs. 7 and 8, various three-dimensional connection structures can be obtained by combining such various types of connection states as described above.

In the case of connecting several types of different-colored blocks, color-coded three-dimensional

connection structures can also be obtained by devising the arrangement of the blocks such that the three-dimensional structure is divided into segments by color.

[0020]

Also, connection structures combined with transparent blocks or blocks with a built-in illuminant may serve as an interior item. Further, connection structures combined with blocks including wheels such as tires or body parts such as faces, eyes, and limbs may serve as a movable toy or a toy animal or doll.

The blocks may have various sizes. For example, the length of each side of small-sized ones may be about 20 mm, middle-sized ones may be about 10 cm, and large-sized ones may be about 1 m. However, blocks having the same size should be basically connected.

Twelve blocks, which are required to assemble the three-dimensional structure exemplified in FIG. 7(C), may be combined and sold in one set.

[Second Embodiment]

[0021]

In a block C according to a second embodiment, one protrusion is provided on one surface and four recessed portions are provided in each of the other five surfaces, as shown in

FIG. 9.

[Third Embodiment]

[0022]

In a block D according to a third embodiment, two surfaces have a protrusion provided thereon. As shown in FIG. 10, protrusions D11 and D31 are provided at the center in one quarter section of the respective first and third surfaces D1 and D3, a pair of surfaces parallel to each other among the six surfaces, and a recessed portion having a size into which a protrusion on another block is fittable is provided at the center in at least one of the other three quarter sections.

[Fourth Embodiment]

[0023]

In a block E according to a fourth embodiment, two surfaces have a protrusion provided thereon. As shown in FIG. 11, protrusions E11 and E21 are provided at the center in one quarter section of the respective first and second surfaces E1 and E2, two adjacent surfaces among the six surfaces, and a recessed portion having a size into which a protrusion on another block is fittable is provided at the center in at least one of the other three quarter sections.

[0024]

As illustrated in the third and fourth embodiments above,

the number of surfaces on which to provide a protrusion is not limited to one but may be two or three or more.

At least one recessed portion is enough to be provided in each surface. Alternatively, two to four recessed portions may be provided in each surface.

In any case, it is only necessary for each protrusion and recessed portion to be provided at the center in each quarter section of one surface.

[Description of Reference Signs]

[0022]

- A Connectable block
- A1 First surface
- A2 Second surface
- A3 Third surface
- A4 Fourth surface
- A5 Fifth surface
- A6 Sixth surface
- A11 Protrusion
- A21 Recessed portion
- B Connectable block
- B1 First surface
- B2 Second surface
- B3 Third surface

B4	Fourth surface
B5	Fifth surface
B6	Sixth surface
B11	Protrusion
B12	Recessed portion
B13	Recessed portion
B14	Recessed portion
B21	Recessed portion
B22	Recessed portion
B51	Recessed portion
B52	Recessed portion
B15	Rib
B16	Rib
C	Connectable block
D	Connectable block
D1	First surface
D11	Protrusion
D3	Third surface
D31	Protrusion
E	Connectable block
E1	First surface
E11	Protrusion
E2	Second surface

E21 Protrusion

[Title of Document] CLAIMS

[Claim 1]

A regular hexahedral block (B) connectable with at least another block by fitting a protrusion provided on a surface of one of the blocks into a recessed portion provided in a surface of the other block, wherein

a protrusion (B11) for connecting the regular hexahedral block to another regular hexahedral block is formed on a first surface (B1) of the regular hexahedral block at the center of one quarter section of the first surface,

three recessed portions (B12, B13, B14) are formed at the center of the three quarter sections of the first surface of the regular hexahedral block where the protrusion is not formed, and

at least one further recessed portion (B21, B41, B51, B61) is provided at the center of one quarter section of each of the second, fourth, fifth and sixth surfaces (B2, B4, B5, B6) of the regular hexahedral block perpendicular to the first surface and at least one further recessed portion (B31) is provided at the center of one quarter section of the third surface (B3) of the regular hexahedral block parallel to the first surface.

[Claim 2]

The regular hexahedral block (B) according to claim 1, wherein

in each of the second, fourth, fifth, and sixth surfaces (B2, B4, B5, B6), recessed portions (B21, B22, B41, B42, B51, B52, B61, B62) are provided at the center of two respective diagonal quarter sections of the surface, and the remaining quarter sections are provided with no protrusion or recessed portion, and wherein recessed portions are provided in the center of all the four quarter sections of the third surface (B3).

[Claim 3]

The regular hexahedral block (B) according to claim 2, wherein

the recessed portions (B21, B22, B41, B42, B51, B52, B61, B62) are provided diagonally in the same direction in each of the second, fourth, fifth, and sixth surfaces (B2, B4, B5, B6).

[Claim 4]

The regular hexahedral block (B) according to any of claims 1 to 3, wherein the protrusion has a square cross-sectional shape, and wherein

at least one recessed portion includes four inner wall surfaces and has a cross-sectional shape into which a protrusion of square cross-sectional shape is fittable.

[Claim 5]

The regular hexahedral block (B) according to claim 1, wherein
in each of the second, third, fourth, fifth, and sixth surfaces (B2, B3, B4, B5,
B6), recessed portions are provided at the center of all the four square quarter
5 sections of each surface.

[Claim 6]

The regular hexahedral block (B) according to any preceding claim, wherein
a rib is formed on at least one of inner wall surface of at least one recessed
portion of the regular hexahedral block.

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