A sectional cubic block includes a plurality of layers of structural elements, a smallest one of which is an elementary cube and the other ones are proportionally increased in dimensions based on the elementary cube and all include three plane walls that separately extend in directions of x, y and z axes and therefore define an inner space adapted to receive a next smaller structural elements therein. Each of the structural elements, except the smallest one, is formed from a plurality of elementary frames sequentially proportionally increased in dimensions based on the elementary cube. Each of the elementary frames includes three continued right-angled parts that are respectively included in three planes extended in the directions of x, y and z axes. This particular configuration of the elementary frames enables children to freely stack the elementary frames to create many changeful shapes.
Fig. 1

Fig. 2
Fig. 5

Fig. 6
Fig. 9

Fig. 10
Fig. 23

Fig. 24
Fig. 27

Fig. 28
Fig. 29

Fig. 30
Fig. 37

Fig. 38
Fig. 39

Fig. 40
SECTIONAL CUBIC BLOCK

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a sectional cubic block that includes a plurality of structural elements, each of which forms a layer of the sectional cubic block and includes a plurality of elementary frames. Through staking these elementary frames, children could extend their imagination to create numerous changeful and balanced shapes.

[0002] Children need suitable “exercises” in the process of development of their brain and muscles, so that they could think and develop the ability of balance. Blocks are most frequently recommended by experts as a constructive toy for children because children observe and manipulate blocks to organize scattered pieces into a complete shape through repeated consideration and assembling. In the process of assembling blocks into a complete shape, children naturally develop and understand the concept of space, the relation between individual parts and a whole body, and the concept of quantity. With blocks, children could embody and enjoy their imaginations. From the building of stable three-dimensional shapes, children are well trained in their mental ability. Thus, blocks are actually a toy having substantial meaning to children.

[0003] However, a really good set of blocks capable of achieving the above brain-training purpose is absolutely not a group of some blocks having different geometrical shapes. An ideal set of blocks includes preferably elementary items that have repeated and ingenious configurations to enable easy holding and assembling thereof, so that numerous interesting, changeful, and balanced structures could be created. It is a pity that we do not easily find such blocks in the markets.

SUMMARY OF THE INVENTION

[0004] It is therefore a primary object of the present invention to provide a sectional cubic block that includes a plurality of elementary members having different sizes but a similar configuration, so that the sectional cubic block could be disassembled into separate parts and reassembled with these parts into unlimited numbers of three-dimensional shapes, while all the created shapes have multi-layered, contoured, and balanced structures.

[0005] To achieve the above and other objects, the sectional cubic block of the present invention mainly includes a plurality of layers of structural elements, a smallest one of which is an elementary cube and the other ones are proportionally increased in dimensions based on the elementary cube and all include three plane walls that separately extend in directions of x, y and z axes and therefore define an inner space adapted to receive a next smaller structural elements therein. Each of the structural elements, except the smallest one, is formed from a plurality of elementary frames sequentially proportionally increased in dimensions based on the elementary cube. Each of the elementary frames that are not the elementary cubes is included in a virtual cubic solid and constitutes two adjacent edges of each side of the virtual cubic solid. That is, each of the elementary frames that are not the elementary cubes includes three continued right-angled parts that are respectively included in three planes extended in the directions of x, y and z axes. This particular configuration of the elementary frames enables children to freely stack the elementary frames to create many changeful shapes.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] The structure and the technical means adopted by the present invention to achieve the above and other objects can be best understood by referring to the following detailed description of the preferred embodiments and the accompanying drawings, wherein

[0007] FIG. 1 is an assembled perspective view showing an exemplified five-layer sectional cubic block according to a first embodiment of the present invention;

[0008] FIG. 2 is an exploded perspective view of the five-layer sectional cubic block of FIG. 1 showing five structural elements thereof;

[0009] FIG. 3 is the first and the largest one of the five structural elements of FIG. 2 viewing from an outer side thereof;

[0010] FIG. 4 is an exploded perspective view of the structural element of FIG. 3 showing five elementary frames thereof;

[0011] FIG. 5 is the second one of the five structural elements of FIG. 2 viewing from an outer side thereof;

[0012] FIG. 6 is an exploded perspective view of the structural element of FIG. 5 showing four elementary frames thereof;

[0013] FIG. 7 is the third one of the five structural elements of FIG. 2 viewing from an outer side thereof;

[0014] FIG. 8 is an exploded perspective view of the structural element of FIG. 7 showing three elementary frames thereof;

[0015] FIG. 9 is the fourth one of the five structural elements of FIG. 2 viewing from an outer side thereof;

[0016] FIG. 10 is an exploded perspective view of the structural element of FIG. 9 showing two elementary frames thereof;

[0017] FIG. 11 is an exploded perspective view of the outmost and the largest one of the five elementary frames of the structural element of FIG. 3;

[0018] FIG. 12 is an exploded perspective view of the second one of the five elementary frames of the structural element of FIG. 3;

[0019] FIG. 13 is an exploded perspective view of the third one of the five elementary frames of the structural element of FIG. 3;

[0020] FIG. 14 is an exploded perspective view of the fourth one of the five elementary frames of the structural element of FIG. 3;

[0021] FIG. 15 is an exploded perspective view showing the sequence of assembling different elementary frames of FIGS. 4, 6, 8 and 10 to form a first special shape;

[0022] FIG. 16 is an assembled perspective view of the first shape formed from the elementary frames of FIG. 15;
FIG. 17 is an exploded perspective view showing the sequence of assembling different elementary frames of FIGS. 4, 6, 8 and 10 to form a second special shape;

FIG. 18 is an assembled perspective view of the second shape formed from the elementary frames of FIG. 17;

FIG. 19 is an exploded perspective view showing the sequence of assembling different elementary frames of FIGS. 4, 6, 8 and 10 to form a third special shape;

FIG. 20 is an assembled perspective view of the third shape formed from the elementary frames of FIG. 19;

FIG. 21 is an assembled perspective view showing an exemplified five-layer sectional cubic block according to a second embodiment of the present invention;

FIG. 22 is an exploded perspective view of the five-layer sectional cubic block of FIG. 21 showing five structural elements thereof;

FIG. 23 is the first and the largest one of the five structural elements of FIG. 22 viewing from an outer side thereof;

FIG. 24 is an exploded perspective view of the structural element of FIG. 23 showing five elementary frames thereof;

FIG. 25 is the second one of the five structural elements of FIG. 22 viewing from an outer side thereof;

FIG. 26 is an exploded perspective view of the structural element of FIG. 25 showing four elementary frames thereof;

FIG. 27 is the third one of the five structural elements of FIG. 22 viewing from an outer side thereof;

FIG. 28 is an exploded perspective view of the structural element of FIG. 27 showing three elementary frames thereof;

FIG. 29 is the fourth one of the five structural elements of FIG. 22 viewing from an outer side thereof;

FIG. 30 is an exploded perspective view of the structural element of FIG. 29 showing two elementary frames thereof;

FIG. 31 is an assembled perspective view showing an exemplified five-layer sectional cubic block according to a third embodiment of the present invention;

FIG. 32 is an exploded perspective view of the five-layer sectional cubic block of FIG. 31 showing five structural elements thereof;

FIG. 33 is the first and the largest one of the five structural elements of FIG. 32 viewing from an outer side thereof;

FIG. 34 is an exploded perspective view of the structural element of FIG. 33 showing five elementary frames thereof;

FIG. 35 is the second one of the five structural elements of FIG. 32 viewing from an outer side thereof;

FIG. 36 is an exploded perspective view of the structural element of FIG. 35 showing four elementary frames thereof;

FIG. 37 is the third one of the five structural elements of FIG. 32 viewing from an outer side thereof;

FIG. 38 is an exploded perspective view of the structural element of FIG. 37 showing three elementary frames thereof;

FIG. 39 is the fourth one of the five structural elements of FIG. 32 viewing from an outer side thereof; and

FIG. 40 is an exploded perspective view of the structural element of FIG. 39 showing two elementary frames thereof.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Please refer to FIG. 1 that shows a sectional cubic block according to a first embodiment of the present invention. The sectional cubic block is formed from a plurality of structural elements. Each structural element forms a layer of the sectional cubic block. The number of the structural elements may be freely increased or decreased. In the illustrated sectional cubic block of FIG. 1, only five structural elements are included for the convenience of explanation of the present invention.

The sectional cubic block of FIG. 1 is assembled from five layers or five structural elements A, B, C, D and E that are proportionally reduced in dimensions. FIG. 2 is an exploded perspective view showing these five structural elements. As can be seen from FIG. 2, the structural element A is the largest and the first one of these five structural elements, and the structural element E is the smallest and the fifth one and forms an elementary cube in the sectional cubic block of the present invention. The first, the second, the third, and the fourth structural elements A, B, C and D all include three plane walls (A01, A02, A03, (B01, B02, B03), (C01, C02, C03), and (D01, D02, D03) that extend in three different directions of x, y and z axes and therefore define an inner space A04, B04, C04 and D04, respectively, for the structural elements A, B, C and D. The structural elements B, C, D and E could be sequentially received in the inner spaces A04, B04, C04 and D04 and thereby form a complete sectional cubic block of the present invention as shown in FIG. 1.

FIGS. 3, 5, 7 and 9 sequentially show the structural elements A, B, C and D, viewed from an outer side of these elements. All these structural elements A, B, C and D could be further disassembled into several elemental frames. FIG. 4 shows the first structural element A is disassembled into five elemental frames, which are denoted as A10, A20, A30, A40 and A50 from the outmost or largest one to the innermost or smallest one. Wherein, the smallest elementary frame A50 is also the smallest structural element E and the elementary cube in the sectional cubic block of the present invention.

Please refer to FIGS. 2, 5 and 6. The second structural element B can be similarly disassembled into four elemental frames, which are denoted as B10, B20, B30 and B40 from the outmost or largest one to the innermost or smallest one. Wherein, the smallest elementary frame B40 is also the smallest structural element E and the elementary cube in the sectional cubic block of the present invention.

Please refer to FIGS. 2, 7 and 8. The third structural element C can be similarly disassembled into three
elementary frames, which are denoted as C10, C20 and C30 from the outermost or largest one to the innermost or smallest one. Wherein, the smallest elementary frame C30 is also the smallest structural element E and the cubic sub-cube in the sectional cubic block of the present invention.

[0052] Please refer to FIGS. 2, 9 and 10. The fourth structural element D can be similarly disassembled into two elementary frames, which are denoted as D10 and D20 from the outer or larger one to the inner or smaller one. Wherein, the smaller elementary frame D20 is also the smallest structural element E and the elementary cube in the sectional cubic block of the present invention.

[0053] As can be seen from FIGS. 4, 6, 8 and 10, any one of the elementary frames A10, A20, A30, A40, B10, B20, B30, C10, C20 and D10 that are not the elementary cubes may be included in a virtual cubic solid and constitutes two adjacent edges of each side of the virtual cubic solid. That is, each of the elementary frames A10, A20, A30, A40, B10, B20, B30, C10, C20 and D10 also sequentially define inner spaces A11, A21, A32, A41, B11, B21, B31, C11, C21 and D11. Please note elementary frames A10, A20, A30, B10, B20 and C10 also define an opening each, via which inner spaces A11, A21, A31, B11, B21 and C11 communicate an inner side with an outer side of the elementary frames A10, A20, A30, B10, B20 and C10, respectively.

[0054] Please refer to FIGS. 4, 11, 12, 13 and 14. Elementary frames A10, A20, A30 and A40 all are assembled from a plurality of the smallest elementary frames A50, each of which is identical to the smallest structural element E of the sectional cubic block of the present invention. As mentioned above, the smallest elementary frames B40, C30 and D20 all are identical to the smallest structural element E. The smallest structural element E is provided on its six sides with at least one insert bar E10 and more than one insert hole E20. When multiple pieces of smallest structural elements E are connected to one another by inserting the insert bar E10 of a rear structural element E into an insert hole E20 of a front structural element E in the manner shown in FIGS. 11 to 14, elementary frames A10, A20 and B10, A30, B20 and C10, and A40, B30, C20 and D10 are formed, respectively.

[0055] The elementary frames and/or the structural elements of the sectional cubic block of the present invention may be freely stacked and/or assembled in many different manners and sequences to create unlimited types of shapes that are always in a balanced position. FIGS. 15 through 20 exemplify some of these unique, interesting and balanced shapes.

[0056] Please refer to FIG. 15. The elementary frames A20, A30, A40 and A50 of the first structural element A are sequentially positioned in the inner spaces A11, A21, A31 and A41 defined in the elementary frames A10, A20, A30 and A40, but not engaged into the openings defined by these elementary frames, such that elementary frames A10, A20, A30, A40 and A50 are stacked one by one from top to top and from the smallest one to the largest one to form a first unit. Similarly, the elementary frames B20, B30 and B40 of the second structural element B are sequentially positioned in the inner spaces B11, B21 and B31 defined in the elementary frames B10, B20 and B30, but not engaged into the openings defined by these elementary frames, such that elementary frames C10, C20 and C30 are stacked one by one from bottom to top and from the largest one to the smallest one to form a second unit. Then, the second unit is stacked on the first unit, the third unit on the second unit, the elementary frame D10 on the third unit, and the elementary frame D20 (that is also the structural element E) in the space D11 defined by the elementary frame D20, so that a first special shape as shown in FIG. 16 is obtained. In this shape, each upper unit is projected from a front central position of a lower unit, giving the shape a multilayer and stepped appearance and well imparting the concept of space.

[0057] FIGS. 17 and 18 illustrate a second special shape assembled from the structural elements A, B, C, D and E. As shown in FIG. 17, the elementary frames B20, B30 and B40 of the second structural element B are sequentially positioned in the inner spaces B11, B21 and B31 defined in the elementary frames B10, B20 and B30, but not engaged into the openings defined by these elementary frames, such that elementary frames C10, C20 and C30 are stacked one by one from bottom to top and from the largest one to the smallest one to form a second unit. Then, the second unit is stacked on the first unit, and the elementary frames D10 and D20 are sequentially stacked on a top of the second unit to form a pyramidal shape. Thereafter, the elementary frames A20, A30, A40 and A50 of the first structural element A are sequentially positioned in the inner spaces A11, A21, A31 and A41 defined in the elementary frames A10, A20, A30 and A40, but not engaged into the openings defined by these elementary frames, such that elementary frames C10, C20, C30 and D10 sequentially locate above the elementary frames D10 and D20 to finally form a second special shape showing alternately arranged projections and recesses, as shown in FIG. 18.

[0058] FIGS. 19 and 20 illustrate a third special shape assembled from some of the elementary frames of the present invention. Please refer to FIG. 19. Elementary frames A10, A20 and A30 are vertically and serially connected to one another using the elementary frames A40, B30 and C20 as connectors between them, such that elementary frames B10, B20 and B30, but not engaged into the openings defined by these elementary frames, such that elementary frames B10, B20, B30 and B40 are stacked one by one from bottom to top and from the largest one to the smallest one to form a second unit. Similarly, the elementary frames C20 and C30 of the third structural element C are sequentially positioned in the inner spaces C11 and C21 defined in the elementary frames C10 and C20, but not engaged into the openings defined by these elementary frames, such that elementary frames C10, C20 and C30 are stacked one by one from bottom to top and from the largest one to the smallest one to form a third unit. Then, the second unit is stacked on the first unit, the third unit on the second unit, the elementary frame D10 on the third unit, and the elementary frame D20 (that is also the structural element E) in the space D11 defined by the elementary frame D20, so that a first special shape as shown in FIG. 16 is obtained. In this shape, each upper unit is projected from a front central position of a lower unit, giving the shape a multilayer and stepped appearance and well imparting the concept of space.
frames A10, A20 and A30 are separately seated and supported in the inner spaces A41, B31 and C21 of the elementary frames A40, B30 and C20. Then, the elementary frame D10 and the smallest structural element E are sequentially stacked on the elementary frame A30 to obtain the third special shape as shown in FIG. 20.

[0059] FIG. 21 shows a sectional cubic block according to a second embodiment of the present invention. This sectional cubic block is also formed from a plurality of structural elements. Each structural element forms a layer of the sectional cubic block. The number of the structural elements may be freely increased or decreased. In the illustrated sectional cubic block of FIG. 21, only five structural elements are included for the convenience of explanation of the present invention.

[0060] The sectional cubic block of FIG. 21 is assembled from five layers or five structural elements F, G, H, I and J that are proportionally reduced in dimensions. FIG. 22 is an exploded perspective view showing these five structural elements. As can be seen from FIG. 22, the structural element F is the largest and the first one of these five structural elements, and the structural element J is the smallest and the fifth one and forms an elementary cube in the sectional cubic block of the present invention. The first, the second, the third, and the fourth structural elements F, G, H and I all include three plane walls (F10, F20, F30), (G01, G02, G03), (H01, H02, H03), and (I01, I02, I03) that extend in three different directions of x, y and z axes and therefore define an inner space F04, G04, H04 and I04, respectively, for the structural elements F, G, H, and I. The structural elements G, H, I and J could be sequentially received in the inner spaces F04, G04, H04 and I04 and thereby form a complete sectional cubic block of the present invention as shown in FIG. 21.

[0061] FIGS. 23, 25, 27 and 29 sequentially show the structural elements F, G, H and I, viewed from an outer side of these elements. All these structural elements F, G, H and I could be further disassembled into several elementary frames. FIG. 24 shows the first structural element F is disassembled into five elementary frames, which are denoted as F10, F20, F30, F40 and F50 from the outermost or largest one to the innermost or smallest one. Wherein, the smallest elementary frame F50 is also the smallest structural element J and the elementary cube in the sectional cubic block of the present invention.

[0062] Please refer to FIGS. 22, 25 and 26. The second structural element G can be similarly disassembled into four elementary frames, which are denoted as G10, G20, G30 and G40 from the outermost or largest one to the innermost or smallest one. Wherein, the smallest elementary frame G40 is also the smallest structural element J and the elementary cube in the sectional cubic block of the present invention.

[0063] Please refer to FIGS. 22, 27 and 28. The third structural element H can be similarly disassembled into three elementary frames, which are denoted as H10, H20 and H30 from the outermost or largest one to the innermost or smallest one. Wherein, the smallest elementary frame H30 is also the smallest structural element J and the elementary cube in the sectional cubic block of the present invention.

[0064] Please refer to FIGS. 22, 29 and 30. The fourth structural element I can be similarly disassembled into two elementary frames, which are denoted as I10 and I20 from the outer or larger one to the inner or smaller one. Wherein, the smaller elementary frame I20 is also the smallest structural element J and the elementary cube in the sectional cubic block of the present invention.

[0065] As can be seen from FIGS. 24, 26, 28 and 30, any one of the elementary frames F10, F20, F30, F40, G10, G20, G30, H10, H20 and I10 that are not the elementary cubes may be included in a virtual cubic solid and constitutes two adjacent edges of each side of the virtual cubic solid. That is, each of the elementary frames F10, F20, F30, F40, G10, G20, G30, H10, H20 and I10 is an integral frame including three continued right-angled parts that are respectively included in three planes extended in the directions of x, y and z axes. The elementary frames F10, F20, F30, G10, G20, G30, H10, H20 and I10 also sequentially define inner spaces F11, F21, F31, G11, G21, G31, H11, H21 and I11. Please note elementary frames F10, F20, F30, G10, G20 and H10 also define an opening each, via which inner spaces F11, F21, F31, G11, G21 and H11 communicate an inner side with an outer side of the elementary frames F10, F20, F30, G10, G20 and H10, respectively.

[0066] The integral elementary frames F10, F20, F30, F40, G10, G20, G30, H10, H20 and I10 are provided on their respective three right-angled parts with unit marks using the smallest structural element J as one unit. These unit marks enable children to actually understand the elementary structure and the number of units of such elementary structure included in a three-dimensional structure, guide children to correctly read and discuss different mathematical units and numbers, and train children to precisely describe the shape of a three-dimensional structure.

[0067] FIG. 31 shows a sectional cubic block according to a third embodiment of the present invention. This sectional cubic block is also formed from a plurality of structural elements. Each structural element forms a layer of the sectional cubic block. The number of the structural elements may be freely increased or decreased. In the illustrated sectional cubic block of FIG. 31, only five structural elements are included for the convenience of explanation of the present invention.

[0068] The sectional cubic block of FIG. 31 is assembled from five layers or five structural elements K, L, M and O that are proportionally reduced in dimensions. FIG. 32 is an exploded perspective view showing these five structural elements. As can be seen from FIG. 32, the structural element K is the largest and the first one of these five structural elements, and the structural element O is the smallest and the fifth one and forms an elementary cube in the sectional cubic block of the present invention. The first, the second, the third, and the fourth structural elements K, L, M and N all include three plane walls (K01, K02, K03), (L01, L02, L03), (M01, M02, M03), and (N01, N02, N03) that extend in three different directions of x, y and z axes and therefore define an inner space K04, L04, M04 and N04, respectively, for the structural elements K, L, M and N. The structural elements L, M, N and O could be sequentially received in the inner spaces K04, L04, M04 and N04 and thereby form a complete sectional cubic block of the present invention as shown in FIG. 31. FIGS. 33, 35, 37 and 39 sequentially show the structural elements K, L, M and N, viewed from an outer side of these elements. All these
structural elements K, L, M and N could be further disassembled into several elementary frames. FIG. 34 shows the first structural element K is disassembled into five elementary frames, which are denoted as K₁₀, K₂₀, K₃₀, K₄₀ and K₅₀ from the outmost or largest one to the innermost or smallest one. Wherein, the smallest elementary frame K₅₀ is also the smallest structural element O and the elementary cube in the sectional cubic block of the present invention.

[0069] Please refer to FIGS. 32, 35 and 36. The second structural element L can be similarly disassembled into four elementary frames, which are denoted as L₁₀, L₂₀, L₃₀ and L₄₀ from the outmost or largest one to the innermost or smallest one. Wherein, the smallest elementary frame L₄₀ is also the smallest structural element O and the elementary cube in the sectional cubic block of the present invention.

[0070] Please refer to FIGS. 32, 37 and 38. The third structural element M can be similarly disassembled into three elementary frames, which are denoted as M₁₀, M₂₀ and M₃₀ from the outmost or largest one to the innermost or smallest one. Wherein, the smallest elementary frame M₃₀ is also the smallest structural element O and the elementary cube in the sectional cubic block of the present invention.

[0071] Please refer to FIGS. 32, 39 and 40. The fourth structural element N can be similarly disassembled into two elementary frames, which are denoted as N₁₀ and N₂₀ from the outer or larger one to the inner or smaller one. Wherein, the smaller elementary frame N₂₀ is also the smallest structural element O and the elementary cube in the sectional cubic block of the present invention.

[0072] As can be seen from FIGS. 34, 36, 38 and 40, any one of the elementary frames K₁₀, K₂₀, K₃₀, K₄₀, L₁₀, L₂₀, L₃₀, M₁₀, M₂₀ and N₁₀ that are not the elementary cubes may be included in a virtual cubic solid and constitutes two adjacent edges of each side of the virtual cubic solid. That is, each of the elementary frames K₁₀, K₂₀, K₃₀, K₄₀, L₁₀, L₂₀, L₃₀, M₁₀, M₂₀ and N₁₀ and N₁₀ is an integral frame including three continued right-angled parts that are respectively included in three planes extended in the directions of x, y and z axes. The elementary frames K₁₀, K₂₀, K₃₀, K₄₀, L₁₀, L₂₀, L₃₀, M₁₀, M₂₀ and N₁₀ also sequentially define inner spaces K₁₁, K₁₂, K₁₃, K₁₄, L₁₁, L₁₂, L₁₃, M₁₁, M₁₂ and N₁₁. Please note elementary frames K₁₀, K₂₀, K₃₀, K₄₀, L₁₀, L₂₀ and M₁₀ also define an opening each, via which inner spaces K₁₁, K₁₂, K₁₃, L₁₁, L₁₂ and M₁₁ communicate an inner side with an outer side of the elementary frames K₁₀, K₂₀, K₃₀, L₁₀, L₂₀ and M₁₀, respectively.

[0073] The following are some advantages of the sectional cubic block of the present invention:

[0074] 1. All the elementary frames constituting the sectional cubic block of the present invention have fully symmetrical shapes and therefore very stable center of gravity that facilitates easy and balanced stacking of these elementary frames. Children may freely assemble the elementary frames into many changeable, firm and stable shapes completely according to their imagination. The sectional cubic block of the present invention therefore allows children to extend their potential of creation.

[0075] 2. The elementary frames of the sectional cubic block of the present invention are proportionally increased or reduced in dimensions and are spatially associative, so that they could be regularly assembled into a cubic solid. Children could be educated through these proportional elementary frames about the concept of permutations in three-dimensional space and the effect that could be achieved through such spatial permutations. Children could be trained to do mathematical operation and quickly read out the number of components included in a three-dimensional structure.

[0076] 3. The elementary frames of the sectional cubic block of the present invention have cute and symmetrical shapes and could be differently connected to form many fantastic and unexpected shapes showing multi-layered and contoured appearances that attract both children and adults.

[0077] 4. Many surprisingly interesting shapes from simple to very complicated structures could be created from the elementary frames of the present invention in the course of stacking them. The present invention is therefore suitable for people of all ages.

[0078] The present invention has been described with some preferred embodiments thereof and the illustrated embodiments have only five layers for the convenience of explanation. It is understood that the sectional cubic block of the present invention may have increased or decreased number of layers, and the size thereof may be proportionally enlarged or reduced. It is also understood that many changes and modifications in the described embodiments can be carried out without departing from the scope and the spirit of the invention that is intended to be limited only by the appended claims.

What is claimed is:

1. A sectional cubic block comprising more than two structural elements, a smallest one of said structural elements being an elementary cube of said sectional cubic block and the other ones of said structural elements being sequentially proportionally increased in dimensions using said elementary cube as one unit of measurement; all said structural elements, except said elementary cube, including three plane walls that separately extend in three different directions of x, y and z axes and therefore define an inner space for each of said structural elements; and a proportionally smaller one of said structural elements being adapted to fitly and removably position in said inner space of a next larger one of said structural elements, such that said structural elements, starting from said smallest one, could be sequentially received in said inner spaces of a next larger one of said structural elements to form a complete sectional cubic block; and

all said structural elements being respectively formed from a plurality of elementary frames, a smallest one of said elementary frames of each said structural elements being identical to said smallest structural element and accordingly said elementary cube of said sectional cubic block, and the other ones of said elementary frames of each said structural elements being sequentially proportionally increased in dimensions using said smallest elementary frame as one unit of measurement; each of said elementary frames that are not said elementary cubic solid and constituting two adjacent edges of each side of said virtual cubic solid, that is, each of said elementary frames that are not said elementary cubes including
three continued right-angled parts that are respectively included in three planes extended in the directions of x, y and z axes and thereby together define an inner space for said elementary frame, and each of said elementary frames that are not the smallest and the next smallest ones among all said elementary frames defining an inner space communicate an inner side with an outer side of each said elementary frame; whereby said elementary frames could be freely stacked to obtain changeful shapes.

2. The sectional cubic block as claimed in claim 1, wherein all said elementary frames are integrally formed.

3. The sectional cubic block as claimed in claim 2, wherein all said elementary frames that are not said elementary cubes are provided on their respective three right-angled parts with unit marks using said smallest elementary cube as one unit, so that how many units of said elementary cubes are included in each of said elementary frames could be easily visually decided.

4. The sectional cubic block as claimed in claim 1, wherein all said elementary frames that are not said elementary cubes are formed by connecting a predetermined number of said smallest elementary frames (that is, said elementary cubes) to one another.

5. The sectional cubic block as claimed in claim 4, wherein each of said elementary cubes, that is, the smallest unit of said elementary frames, is provided on at least one of six sides thereof with an insert bar and on the other five sides thereof with more than one insert hole, and each of said insert bars is adapted to firmly insert into any one of said insert holes.

* * * * *