Building Block Sheet and Building Block Set

Technical Field

[0001] The present invention belongs to the field of building block toys, and specifically relates to a building block sheet and a building block toy.

Background

[0002] Traditional building blocks usually only include multiple wooden or plastic blocks or sheets, which can be assembled by children into various shapes. Due to the relatively simple functions and playing methods, the building blocks have limited appeal to children, especially older children. For this reason, in recent years, functional building blocks equipped with electronic devices have emerged, batteries and electronic devices capable of realizing functions such as sound production or light emission are arranged in the blocks or sheets, which bring more fun to children through sound and light effects and expand the playing methods of building block toys.

[0003] At present, such functional building blocks are mainly divided into two categories. The first category features that each block or sheet is internally provided with a battery, an electronic device, a circuit board, a switch, connecting wires and the like individually, the switch may be a toggle switch exposed on a surface or a push switch arranged inside, and children can make the building block emit light or produce sound by toggling the switch or pressing the building block. This type of building blocks is high in costs, and often lacks a linkage effect among multiple blocks or sheets. The second category features that each block or sheet is internally provided with an electronic device, a circuit board, connecting wires and the like, and is equipped with exposed connection terminals or connection leads that can be led out to the outside; and multiple blocks or sheets can be electrically connected to each other via the connection terminals or leads and further connected to a battery. This type of building blocks needs to be manually connected to the external battery, which is inconvenient for children to operate.

[0004] Furthermore, the above two types of functional building blocks also have a common problem: the electronic components and circuit structures within individual blocks or sheets are relatively complex, making them prone to malfunctions. Taking light-emitting building blocks as an embodiment, each block or sheet is internally provided with at least an LED light-emitting device, a circuit board for driving the light-emitting device, and a plurality of wires that connect the light-emitting device to the circuit board as well as to an internal battery or connection terminals; and furthermore, to enable the light emitted by the internal light-emitting device to penetrate through to the outside, an outer shell of the block or sheet is made of a transparent or semi-transparent material. In the process of children playing with building blocks, the blocks or sheets may inevitably be bumped and dropped many times, leading to poor connection of the wires and electrical contacts, so that multiple blocks or sheets may soon lose their light-emitting function, affecting the play experience. Additionally, the transparent or semi-

transparent outer shell exposes the disorganized internal wiring and other structures, which also makes the product less aesthetically pleasing.

Summary

[0005] The present invention is made to solve at least one of the above-mentioned problems, and aims to provide a functional building block sheet and a building block toy with a simpler and more reliable internal structure. The present invention adopts the following technical solutions:

[0006] The present invention provides a building block sheet, which has the following technical features: The building block sheet includes: a shell, including a base and a cover plate matched with the base; an electrical connection assembly, arranged on the base; and a functional assembly, electrically connected by the electrical connection assembly. The electrical connection assembly includes a positive electrode conductive frame and one or more positive electrodes arranged on the positive electrode conductive frame, a negative electrode conductive frame and one or more negative electrodes arranged on the negative electrode conductive frame. The functional assembly is in contact with the positive electrode conductive frame and the negative electrode conductive frame respectively. The shell is provided with one or more edge portions for contacting other building block sheets. The edge portions are provided with a plurality of electrode accommodating notches, and the positive electrodes and the negative electrodes are respectively disposed in the corresponding electrode accommodating notches.

[0007] The building block sheet provided by the present invention may further have the following technical feature: The edge portions have a plurality of facets, the positive electrodes and the negative electrodes both have a plurality of contact surfaces corresponding to the facets of the edge portions, and the contact surfaces are exposed from the corresponding electrode accommodating notches to the outside of the corresponding facets.

[0008] The building block sheet provided by the present invention may further have the following technical feature: The edge portions have curved surfaces, the positive electrodes and the negative electrodes both have contact surfaces corresponding to the curved surfaces of the edge portions, and the contact surfaces are exposed from the corresponding electrode accommodating notches to the outside of the curved surfaces.

[0009] The building block sheet provided by the present invention may further have the following technical feature: The shell is provided with a plurality of clamping grooves corresponding to the electrode accommodating notches. Both the positive electrodes and the negative electrodes are block-shaped, and rear ends thereof are clamped to the shell through the clamping grooves.

[0010] The building block sheet provided by the present invention may further have the following technical feature: A plurality of edge portions are provided to define a polygon. The electrical connection assembly further includes an isolation frame arranged between the

positive electrode conductive frame and the negative electrode conductive frame to isolate the positive electrode conductive frame from the negative electrode conductive frame. The functional assembly is arranged at an inner side of the isolation frame. The positive electrode conductive frame, the negative electrode conductive frame and the isolation frame are all matched with the polygon.

[0011] The building block sheet provided by the present invention may further have the following technical feature: One of the positive electrode conductive frame/the negative electrode conductive frame and the isolation frame is provided with a plurality of positioning holes, and the other one is provided with a plurality of positioning columns matched with the positioning holes. The positive electrode conductive frame is provided with negative electrode avoidance notches corresponding to the negative electrodes for avoiding the negative electrodes, and the negative electrode conductive frame is provided with positive electrode avoidance notches corresponding to the positive electrodes for avoiding the positive electrodes.

[0012] The building block sheet provided by the present invention may further have the following technical feature: The positive electrode conductive frame and the plurality of positive electrodes are integrally formed, and at least part of an outer surface of the positive electrode conductive frame and at least part of an outer surface of each of the positive electrodes are made of a conductive material. The negative electrode conductive frame and the plurality of negative electrodes are integrally formed, and at least part of an outer surface of the negative electrode conductive frame and at least part of an outer surface of each of the negative electrodes are made of a conductive material. At least part of an outer surface of the isolation frame is made of an insulating material.

[0013] The building block sheet provided by the present invention may further have the following technical feature: The building block sheet further includes a plurality of magnetic attraction members. Each of the edge portions is provided with a pair of magnetic attraction members for attracting and binding with an edge portion of another building block sheet. The pair of magnetic attraction members are arranged on the corresponding edge portion in a polarity-complementary manner.

[0014] The building block sheet provided by the present invention may further have the following technical feature: The edge portion has a fitting structure for assembling and binding with an edge portion of another building block sheet with a corresponding fitting structure.

[0015] The building block sheet provided by the present invention may further have the following technical feature: The building block sheet is a functional building block sheet. The functional assembly includes: a power supply rack, provided with one or more positive connection terminals and one or more negative connection terminals, the positive connection terminals and the negative connection terminals are respectively configured to contact the positive electrode conductive frame and the negative electrode conductive frame to achieve

electrical connection; and one or more functional electrical devices, arranged on the power supply rack. The functional electrical devices include any one or a combination of two or more of a light-emitting device, a sound production device and an acousto-optic device.

[0016] The building block sheet provided by the present invention may further have the following technical feature: The positive electrode conductive frame is provided with one or more protrusions for positive electrode contact, and the protrusions are provided on a side face of the positive electrode conductive frame facing the isolation frame. The negative electrode conductive frame is provided with one or more protrusions for negative electrode contact, and the protrusions are provided on a side face of the negative electrode conductive frame facing the isolation frame. The isolation frame is provided with positive electrode fitting grooves matching the protrusions for positive electrode contact, and negative electrode fitting grooves matching the protrusions for negative electrode contact. The positive connection terminals are arranged inside the positive electrode fitting grooves, and are in contact with the protrusions for positive electrode contact by fitting the protrusions for positive electrode contact into the positive electrode fitting grooves. The negative connection terminals are arranged inside the negative electrode fitting grooves, and are in contact with the protrusions for negative electrode contact by fitting the protrusions for negative electrode contact into the negative electrode fitting grooves.

[0017] The building block sheet provided by the present invention may further have the following technical feature: A plurality of functional electrical devices are provided, which are light-emitting devices. The power supply rack is in a strip shape, a cross shape, a star shape, a polygonal shape or a combination thereof, and the plurality of light-emitting devices are arranged along a contour of the power supply rack.

[0018] The building block sheet provided by the present invention may further have the following technical feature: The building block sheet is a power supply building block sheet, and the functional assembly includes an electrical storage device arranged at an inner side of the electrical connection assembly.

[0019] The building block sheet provided by the present invention may further have the following technical feature: The functional assembly further includes a circuit board electrically connected to the electrical storage device. The circuit board is at least provided with a switch button and a charging interface. The shell is provided with clearance holes matching the switch button and the charging interface, and the switch button and the charging interface are exposed from the clearance holes.

[0020] The present invention provides a building block toy, which has the following technical features: The building block toy includes a plurality of building block sheets. Some of the building block sheets serve as functional building block sheets, and some of the building block sheets serve as power supply building block sheets for supplying power to the functional building block sheets. The building block sheets are any of the above-mentioned building block

sheets. The functional building block sheets are any of the above-mentioned functional building block sheets. The power supply building block sheets are any of the above-mentioned power supply building block sheets.

[0021] Functions and effects of the present invention

[0022] The building block sheet provided by the present invention includes the shell, the electrical connection assembly and the functional assembly. Since the electrical connection assembly includes the positive electrode conductive frame, the positive electrodes, the negative electrode conductive frame and the negative electrodes, the functional assembly is in contact with the positive and negative electrode conductive frames respectively to achieve electrical connection, and the positive electrodes and the negative electrodes are respectively exposed through the corresponding notches formed in the shell, a plurality of building block sheets can be electrically connected to each other through contact between the positive and negative electrodes thereof after being assembled together. Electrical components in each building block sheet are powered by the positive and negative electrode conductive frames, which can reduce or even completely eliminate the use of conductive wires, and can also reduce or even avoid electrical contacts such as solder joints accordingly, so that the internal electrical connection structure of the building block sheet is simple and reliable. The electrical connection structure is not prone to failure even in the event of collision, dropping or the like during play. Furthermore, the building block sheet is also easier to assemble, which can improve production efficiency.

[0023] The building block toy provided by the present invention includes the power supply building block sheets and the functional building block sheets which have the same exposed positive and negative electrode structures, so that children only need to assemble the power supply building block sheets with the functional building block sheets in the same way as assembling other building block sheets during play, without the need to connect an external battery additionally, making it more convenient to use.

Brief Description of Figures

[0024] FIG. 1 is a three-dimensional view of a building block sheet in Embodiment 1 according to the present invention;

[0025] FIG. 2 is a schematic diagram of breakdown structures of the building block sheet in Embodiment 1 according to the present invention;

[0026] FIG. 3 is a schematic diagram of breakdown structures of the building block sheet from a different perspective in Embodiment 1 according to the present invention;

[0027] FIG. 4 is a schematic diagram of breakdown structures of an electrical connection assembly and a functional assembly in Embodiment 1 according to the present invention;

[0028] FIG. 5 is a sectional view of local structure of the building block sheet in Embodiment 1 according to the present invention;

[0029] FIG. 6 is a three-dimensional view of a building block sheet in Embodiment 2 according to the present invention;
[0030] FIG. 7 is a schematic diagram of breakdown structures of the building block sheet in Embodiment 2 according to the present invention;
[0031] FIG. 8 is a schematic diagram of breakdown structures of an electrical connection assembly and a functional assembly in Embodiment 2 according to the present invention;
[0032] FIG. 9 is a sectional view of local structure of the building block sheet in Embodiment 2 according to the present invention;
[0033] FIG. 10 is a three-dimensional view of an electrical connection assembly in Embodiment 3 according to the present invention;
[0034] FIG. 11 is a schematic sectional view of a front side of the electrical connection assembly in Embodiment 3 according to the present invention;
[0035] FIG. 12 is a schematic structural view of a back side of the electrical connection assembly in Embodiment 3 according to the present invention;
[0036] FIG. 13 is a schematic diagram of breakdown structures of a building block sheet in Embodiment 4 according to the present invention;
[0037] FIG. 14 is a three-dimensional view of an electrical connection assembly and a functional assembly in Embodiment 6 according to the present invention;
[0038] FIG. 15 is a schematic diagram of breakdown structures of the electrical connection assembly and the functional assembly in Embodiment 6 according to the present invention;
[0039] FIG. 16 is a schematic diagram of breakdown structures of a building block sheet in Modified Example 1 according to the present invention;
[0040] FIG. 17 is a schematic diagram of breakdown structures of a building block sheet in Modified Example 2 according to the present invention;
[0041] FIG. 18 is a schematic diagram of breakdown structures of a building block sheet in Modified Example 3 according to the present invention;
[0042] FIG. 19 is a schematic diagram of breakdown structures of a building block sheet in Modified Example 4 according to the present invention;
[0043] FIG. 20 is a schematic diagram of breakdown structures of a building block sheet in Modified Example 5 according to the present invention;
[0044] FIG. 21 is a schematic diagram of breakdown structures of a building block sheet in Modified Example 6 according to the present invention;
[0045] FIG. 22 is a schematic diagram of breakdown structures of a building block sheet in Modified Example 7 according to the present invention;
[0046] FIG. 23 is a schematic diagram of breakdown structures of a building block sheet in Modified Example 8 according to the present invention;
[0047] FIG. 24 is a schematic diagram of breakdown structures of a building block sheet in Modified Example 9 according to the present invention;

[0048] FIG. 25 is a schematic diagram of breakdown structures of a building block sheet in Modified Example 10 according to the present invention;
[0049] FIG. 26 is a schematic diagram of breakdown structures of a building block sheet in Modified Example 11 according to the present invention;
[0050] FIG. 27 is an exemplary view of a plurality of building block sheets assembled together in Modified Example 12 according to the present invention;
[0051] FIG. 28 is an exemplary view of a plurality of building block sheets assembled together in Modified Example 13 according to the present invention;
[0052] FIG. 29 is a schematic diagram of breakdown structures of a building block sheet in Modified Example 14 according to the present invention;
[0053] FIG. 30 is a three-dimensional view of a building block sheet in Modified Example 15 according to the present invention;
[0054] FIG. 31 is a three-dimensional view of a building block sheet in Modified Example 16 according to the present invention;
[0055] FIG. 32 is a three-dimensional view of a building block sheet in Modified Example 17 according to the present invention;
[0056] FIG. 33 is a three-dimensional view of a building block sheet in Modified Example 18 according to the present invention;
[0057] FIG. 34 is a schematic diagram of breakdown structures of a building block sheet in Modified Example 19 according to the present invention;
[0058] FIG. 35 is a schematic diagram of breakdown structures of a building block sheet in Modified Example 20 according to the present invention;
[0059] FIG. 36 is an exemplary view of a plurality of building block sheets assembled together in Modified Example 21 according to the present invention; and
[0060] FIG. 37 is an exemplary view of a plurality of building block sheets assembled together in Modified Example 22 according to the present invention.
[0061] Reference numeral description:
[0062] shell 1; base 11; base fixing hole 111; magnetic attraction member accommodating groove 112; electrode accommodating groove 113; cover plate 12; cover plate fixing hole 121; magnetic attraction member limit protrusion 122; electrode matching groove 123; button clearance hole 124; interface clearance hole 125; magnetic attraction member accommodating portion 9; electrode clamping groove 13; magnetic attraction member 2; cavity 3; electrical connection assembly 4; positive electrode conductive frame 41; protrusion for positive electrode contact 411; positive electrode positioning column 412; negative electrode avoidance notch 413; isolation frame 42; positive electrode fitting groove 421; negative electrode fitting groove 422; positioning hole 423; negative electrode conductive frame 43; protrusion for negative electrode contact 431; negative electrode positioning column 432; positive electrode avoidance notch 433; electrode 5; positive electrode 51; negative electrode 52; functional

assembly 6; power supply rack 161; positive connection terminal 17; negative connection terminal 18; electrical device 162; electrical storage device 61; circuit board 62; button 63; switch button 631; function button 632; charging interface 64; clearance cavity 300; and wiring board 402.

Detailed Description

[0063] To make it easy to understand the technical means, creative features, objectives and effects for implementation of the present invention, a building block sheet and a building block toy provided by the present invention will be described in detail below in conjunction with embodiments and accompanying drawings.

[0064] Embodiment 1

[0065] FIG. 1 is a three-dimensional view of a building block sheet in the present embodiment.

[0066] As shown in FIG. 1, the present embodiment provides a building block sheet. The building block sheet includes a shell 1 (i.e., a building block main body), a plurality of magnetic attraction members 2, an electrical connection assembly 4 (i.e., a conductive frame assembly), and a functional assembly 6 (i.e., an electrical functional module).

[0067] The shell 1 has a roughly square sheet-shaped overall shape with rounded corners and four edge portions (i.e., edge sides) of equal length. Each of the edge portions has both a magnetic attraction capability and an electrical connection capability. In an alternative solution, only one edge portion or some of the edge portions may have the magnetic attraction capability and the electrical connection capability.

[0068] FIG. 2 is a schematic diagram of breakdown structures of the building block sheet in the present embodiment, and FIG. 3 is a schematic diagram of breakdown structures of the building block sheet from a different perspective in the present embodiment.

[0069] As shown in FIG. 2 and FIG. 3, the shell 1 includes a base 11 and a cover plate 12, both of which are made of semi-transparent materials that facilitate light transmission.

[0070] The base 11 is generally in the shape of a rectangular cover as a whole, one side of the base 11 is an opening side, cylindrical protrusions are respectively formed at inner sides of four corner portions of the base 11, and a circular through base fixing hole 111 is formed in the middle of each of the four corner portions. Two magnetic attraction member accommodating grooves 112 and a pair of electrode accommodating grooves 113 (i.e., avoidance grooves I) are formed in an inner side of each of four edge portions of the base 11. The magnetic attraction member accommodating grooves 112 are elongated rectangular grooves, and the two magnetic attraction member accommodating grooves 112 are provided in the middle of the corresponding edge portion. The electrode accommodating grooves 113 are substantially open rectangular grooves. In the present embodiment, a pair of electrode accommodating grooves 113 are respectively formed close to two ends of the corresponding edge portion, that is, respectively close to the two corner portions of the base 11 connected to the edge portion, and

the two magnetic attraction member accommodating grooves 112 are disposed between the pair of electrode accommodating grooves 113.

[0071] The cover plate 12 is in a rectangular plate shape with protrusions on one surface, cylindrical protrusions are respectively formed on four corner portions of the cover plate 12, and a circular through cover plate fixing hole 121 is formed in the middle of each of the four corner portions. Magnetic attraction member limit protrusions 122 and electrode matching grooves 123 (i.e., avoidance grooves II) are formed in surfaces of one sides of four edge portions of the cover plate 12. The magnetic attraction member limit protrusions 122 are strip-shaped protrusions, and are arranged corresponding to the magnetic attraction member accommodating grooves 112. The electrode matching grooves 123 are substantially open rectangular grooves, and are formed corresponding to the electrode accommodating grooves 113.

[0072] The cover plate 12 is fitted into the opening side of the base 11, and is fixed to the base 11 by a clamping structure, and forms the shell 1 after being closed. A cavity 3 is formed inside the shell 1.

[0073] When the cover plate 12 is closed on the base 11, the magnetic attraction member accommodating grooves 112 on the base 11 and the corresponding magnetic attraction member limit protrusions 122 on the cover plate 12 are assembled to form magnetic attraction member accommodating portions 9 (i.e., mounting grooves). Eight magnetic attraction member accommodating portions are provided, with two magnetic attraction member accommodating portions 9 correspondingly provided on each edge side.

[0074] When the cover plate 12 is closed on the base 11, the electrode accommodating grooves 113 in the base plate 11 are aligned and matched with the corresponding electrode matching grooves 123 in the cover plate 12 to form complete electrode accommodating notches (i.e. avoidance cavities) and electrode clamping grooves 13 (i.e. clamping fit grooves). The electrode clamping grooves 13 correspond to the electrode accommodating notches on a one-to-one basis, and each of the electrode clamping grooves 13 is in communication with the corresponding electrode accommodating notch and the cavity 3. In the present embodiment, each edge portion of the shell 1 has three facets (outer surfaces), the middle facet is perpendicular to the two facets located on two sides, and the electrode accommodating notch forms a rectangular opening in each of the three facets.

[0075] In an alternative solution, the edge portions of the shell 1 may also have other shapes, for example, having three or more facets or having curved surfaces.

[0076] A plurality of magnetic attraction members 2 (i.e., magnetic members) are disposed inside the shell 1. The magnetic attraction members 2 are preferably permanent magnets, and the magnetic attraction members 2 are fitted in the corresponding magnetic attraction member accommodating portions 9 in one-to-one correspondence, thereby positioning and constraining the magnetic attraction members 2.

[0077] The magnetic attraction members 2 are magnetized along their own thickness direction such that two ends in the thickness direction are an N pole and an S pole, respectively. In the two magnetic attraction member accommodating portions 9 at each edge side, the two magnetic attraction members 2 are installed in a polarity-complementary manner. That is, one magnetic attraction member 2 is inserted with its N pole facing a bottom of the magnetic attraction member accommodating groove 112, and the other magnetic attraction member 2 is relatively rotated by 180° to be inserted with its S pole facing the bottom of the magnetic attraction member accommodating groove 112. The two magnetic attraction members 2 at each edge side follow the above magnetic pole configuration rule to ensure symmetry of magnetic pole distribution on each edge side of the building block sheet. This arrangement enables the magnetic attraction members on one building block sheet to form polarity complementation with the magnetic attraction members on the corresponding edge side of an adjacent building block sheet even if the one building block sheet is rotated by 180° when the two adjacent building block sheets are butted via their edge sides, thereby achieving reliable attraction.

[0078] In the present embodiment, the building block sheets are assembled by the magnetic attraction members. In an alternative solution, the building block sheets may also be assembled by other connecting means, for example, the edge portions of the building block sheets are provided with fitting structures for assembling, or the edge portions of the building block sheets are provided with bonding structures such as Velcro.

[0079] FIG. 4 is a schematic diagram of breakdown structures of the electrical connection assembly and the functional assembly in the present embodiment.

[0080] As shown in FIG. 1 to FIG. 4, the electrical connection assembly 4 is installed in the cavity 3, which is adapted to its contour. The electrical connection assembly 4 includes a positive electrode conductive frame 41 (i.e., a positive conductive wire frame), a plurality of positive electrodes 51 (i.e., positive terminals), an isolation frame 42 (i.e., a boundary frame), a negative electrode conductive frame 43 (i.e., a negative conductive wire frame), and a plurality of negative electrodes 52 (i.e., negative terminals).

[0081] The positive electrode conductive frame 41, the isolation frame 42, and the negative electrode conductive frame 43 are all rectangular frames matching a rectangle defined by the plurality of edge portions of the shell 1. The three layers of frames are stacked in sequence from top to bottom and are fitted into the shell 1. In the present embodiment, the positive electrode conductive frame 41 is disposed close to the cover plate 12, and the negative electrode conductive frame 43 is disposed close to the base 11.

[0082] The positive electrode conductive frame 41 and the negative electrode conductive frame 43 are made of a non-metallic material, and their surfaces are each plated with a conductive metal surface layer to achieve an electric conduction effect. In an alternative solution, the positive electrode conductive frame 41 and the negative electrode conductive

frame 43 may be made of a metallic material such as iron or copper, or, provided that the electric conduction function can be realized, a conductive metal surface layer may be formed on part of the surface of each of the positive electrode conductive frame 41 and the negative electrode conductive frame 43.

[0083] A plurality of positive electrode positioning columns 412 (i.e., fixing columns) are distributed on the side of the positive electrode conductive frame 41 facing the isolation frame 42. A plurality of negative electrode positioning columns 432 are distributed on the side of the negative electrode conductive frame 43 facing the isolation frame 42.

[0084] One or more protrusions 411 for positive electrode contact (i.e., protrusion portions I) are provided on an end surface of the side of the positive electrode conductive frame 41 facing the isolation frame 42. In the present embodiment, two protrusions 411 for positive electrode contact are provided, which are respectively provided at two adjacent corner portions of the positive electrode conductive frame 41. One or more protrusions 431 for negative electrode contact (i.e., protrusion portions II) are provided on an end surface of the side of the negative electrode conductive frame 43 facing the isolation frame 42. In the present embodiment, two protrusions 431 for negative electrode contact are provided, which are respectively provided at two adjacent corner portions of the negative electrode conductive frame 43.

[0085] The isolation frame 42 is made of an insulating material, or at least the part of a surface thereof in contact with the conductive frames is made of the insulating material. The isolation frame 42 is located between the positive electrode conductive frame 41 and the negative electrode conductive frame 43 to provide an isolation function and prevent short circuit caused by contact therebetween. A plurality of through positioning holes 423 are provided in the isolation frame 42. The positive electrode positioning columns 412 and the negative electrode positioning columns 432 are disposed in one-to-one correspondence with the positioning holes 423. During assembly, the positive electrode positioning columns 412 and the negative electrode positioning columns 432 are respectively inserted into the corresponding positioning holes 423, so as to achieve relative fixation and positioning of the three layers of frames. One or more positive electrode fitting grooves 421 (i.e., fitting grooves I) are formed in an end surface of the side of the isolation frame 42 facing the positive electrode conductive frame 41, and one or more negative electrode fitting grooves 422 (i.e., fitting grooves II) are formed in an end surface of the isolation frame 42 facing the negative electrode conductive frame 43.

[0086] The positive electrode conductive frame 41 and the negative electrode conductive frame 43 extend outward to form one or more pairs of electrodes 5 with opposite polarities, and each pair of electrodes 5 include a positive electrode 51 and a negative electrode 52. In the present embodiment, four pairs of electrodes 5 are provided, where the four positive electrodes 51 are integrally formed with the positive electrode conductive frame 41, and the four negative electrodes 52 are integrally formed with the negative electrode conductive frame 43. The four pairs of electrodes 5 are respectively arranged on the four edge portions of the

shell 1, and the positions of the four pairs of electrodes 5 respectively correspond to the positions of the electrode accommodating notches in the shell 1, that is, each pair of positive electrode 51 and negative electrode 52 are respectively located at two sides of the two magnetic attraction members 2 on one edge portion of the shell 1. Such an arrangement can enlarge a magnetic attraction contact area and reduce magnetic flux attenuation, thereby making the attraction of the magnetic attraction members 2 more stable.

[0087] Each electrode 5 is block-shaped, a rear end thereof is fixed to the corresponding conductive frame, and a front end thereof is in a rectangular block shape with the size larger than that of the rear end. The width of the front end is substantially the same as the width of the electrode accommodating notch, and the height of the front end is slightly greater than the thickness of the shell 1. The front end of each electrode 5 is fitted into the corresponding electrode accommodating notch, and the rear end thereof is correspondingly clamped into the corresponding electrode clamping groove 13, thereby further achieving positioning of the electrode 5. Three outer surfaces of the front end of each electrode 5 serve as contact regions for contacting electrodes 5 of other building block sheets. These three outer surfaces are exposed outward from the three facets of the corresponding edge portion of the shell 1, respectively, and each outer surface of the front end of the electrode 5 is located further outward relative to the corresponding facet.

[0088] In an alternative solution, the electrode 5 may also take on other shapes that match the shape of the edge portion of the shell 1. For example, when the edge portion has three or more facets, the electrode 5 is also in a corresponding polygonal block shape with three or more contact surfaces; and when the facet has a curved surface, the electrode 5 is also in a corresponding block shape with a curved surface.

[0089] That is, the contact regions of each positive electrode 51 and each negative electrode 52 are exposed on the side surfaces and upper and lower end surfaces of the shell 1, providing multiple pairs of combinations of positive electrodes 51 and negative electrodes 52 for current to flow through and form a circuit.

[0090] In addition, as shown in FIG. 4, in the present embodiment, two of the positive electrodes 51 are disposed at two sides of one corner portion of the positive electrode conductive frame 41 where the protrusion 411 for positive electrode contact is provided, another corner portion opposite to this corner portion (located on the same diagonal line) is not provided with positive electrodes 51, but is provided with two negative electrode avoidance notches 413 matching the electrodes 5, which are configured to avoid the negative electrodes 52 during assembly and prevent the negative electrodes 52 from contacting the positive electrode conductive frame 41. One positive electrode 51 and one negative electrode avoidance notch 413 are respectively provided at two sides of another corner portion of the positive electrode conductive frame 41 where the protrusion 411 for positive electrode contact is provided, and one positive electrode 51 and one negative electrode avoidance notch 413 are

also respectively provided at two sides of another corner portion opposite to the above corner portion. The arrangement of the negative electrode conductive frame 43 and the negative electrodes 52 is consistent with that of the positive electrode conductive frame 41 and the positive electrodes 51. That is, the negative electrode conductive frame 43 is also provided with a plurality of positive electrode avoidance notches 433, which are configured to prevent the negative electrode conductive frame 43 from contacting the positive electrodes 51 during assembly. The distribution of the positive electrode avoidance notches 433 and the negative electrodes 52 is consistent with that of the negative electrode avoidance notches 413 and the positive electrodes 51. Therefore, when arranged in the state as shown in FIG. 4, the positive electrodes 51 correspond to the positive electrode avoidance notches 433 in the negative electrode conductive frame 43, and the negative electrodes 52 correspond to the negative electrode avoidance notches 413 in the positive electrode conductive frame 41, respectively.

[0091] When two building block sheets are magnetically assembled by means of the magnetic attraction members 2, the positive electrodes 51 of the two sheets at two sides of an attracting position come into contact with each other to achieve positive electrode interconnection; and at the same time, the negative electrodes 52 of the two sheets at two sides of the attracting position are also butted accordingly to achieve negative electrode interconnection, thereby establishing a conductive path on an assembled surface to meet the requirement of forming a complete current loop. When the two building block sheets are fitted and assembled in a mutually perpendicular state, their assembled surfaces can also be brought into contact via the respective exposed positive and negative terminals to form a conductive path, thereby achieving electrical connectivity in different directions of assembling. Since the electrode 5 has three exposed contact surfaces and is located further outward relative to the corresponding facet, the two building block sheets can be assembled at any angle, that is, when the two building block sheets are assembled, an included angle between their adjacent two surfaces ranges from 0 degree to 360 degrees.

[0092] The functional assembly 6 includes a power supply rack 161 (i.e., a power conduction rack) and one or more electrical devices (functional electrical device). In the present embodiment, the electrical devices are a plurality of light-emitting devices 162 (i.e., light-emitting units).

[0093] The power supply rack 161 includes a plurality of elongated rack body portions (i.e., support subsections), and the power supply rack 161 is provided with at least one positive connection terminal 17 and at least one negative connection terminal 18, which are respectively located at two ends of the rack body portions. In the present embodiment, the power supply rack 161 is X-shaped, with two positive connection terminals 17 and two negative connection terminals 18 symmetrically extending from two ends. In an alternative solution, the power supply rack 161 may also be configured in a rectangular, triangular, cross-shaped, flower-shaped or other shape.

[0094] After assembly, the two positive connection terminals 17 are fitted into two positive electrode fitting grooves 421 in one-to-one correspondence, and the two protrusions 411 for positive electrode contact are respectively fitted into the corresponding positive electrode fitting grooves 421 and come into contact with the positive connection terminals 17 fitted therein, thereby establishing an electrical connection for the positive electrodes. An electrical connection for the negative electrodes is established in the same manner: the two negative connection terminals 18 are fitted into two negative electrode fitting grooves 422 in one-to-one correspondence, and the two protrusions 431 for negative electrode contact are respectively fitted into the corresponding negative electrode fitting grooves 422 and come into contact with the negative connection terminals 18 fitted therein, thereby establishing the electrical connection for the negative electrodes.

[0095] The light-emitting devices 162 are preferably LED lamps, which are mounted on the power supply rack 161. In the present embodiment, each of the rack body portions of the power supply rack 161 is provided with the light-emitting devices 162, and the light-emitting devices 162 are arranged across two opposite sides of the rack body portion, so that both the front and back sides of the building block sheet can emit light when current flows through, thus ensuring that the light from the light-emitting devices 162 inside the building block sheet is visible on both sides after power is supplied.

[0096] In addition, the design of the power supply rack 161 is flexible. On the premise that the power supply rack 161 is provided with at least one positive connection terminal 17 and at least one negative connection terminal 18 to meet the basic electrical connection requirements, a number of additional positive connection terminals 17 and negative connection terminals 18 may be freely extended and added according to shape and functional requirements of the power supply rack, so as to adapt to the internal layout and electrical connection requirements of the shell 1 in different forms.

[0097] The specific structures of the power supply rack 161 and the light-emitting devices 162 are based on the prior art. For example, existing flexible LED light strips may be adopted, and thus will not be described in detail herein.

[0098] The specific working process of the building block sheet in the present embodiment is as follows:

[0099] Since the stacked electrical connection assembly 4 is disposed inside the cavity 3 of the shell 1, the two conductive frames are isolated from each other by the isolation frame 42 to prevent contact therebetween. The positive electrodes 51 and the negative electrodes 52, which are respectively connected to the positive electrode conductive frame 41 and the negative electrode conductive frame 43, extend outward from the conductive frames to the outer surface of the shell 1. The positive connection terminals 17 of the functional assembly 6 are connected to the positive electrode conductive frame 41, and the negative connection terminals 18 are connected to the negative electrode conductive frame 43. When the building

block sheet is connected to a power supply, the current path follows the positive electrodes 51, the positive electrode conductive frame 41, the functional assembly 6, the negative electrode conductive frame 43, and the negative electrodes 52, thereby realizing a complete current loop. When two such building block sheets are magnetically assembled by means of the magnetic attraction members 2, the magnetic force drives the positive electrodes 51 and negative electrodes 52 on two sides of the assembled surface to be aligned and contacted accurately with each other, thereby transmitting current to the assembled building block sheets and automatically establishing a conductive path across the building block sheets, which enables multiple assembled building block sheets to trigger the light-emitting function and thus realizes an intelligent interactive experience of power-on upon assembling.

[0100] Functions and effects of Embodiment 1

[0101] The building block sheet provided according to the present embodiment includes the shell, the electrical connection assembly and the functional assembly. Since the electrical connection assembly includes the positive electrode conductive frame, the positive electrodes, the negative electrode conductive frame and the negative electrodes, the functional assembly is in contact with the positive and negative electrode conductive frames respectively to achieve electrical connection, and the positive electrodes and the negative electrodes are respectively exposed through the corresponding notches formed in the shell, a plurality of building block sheets can be electrically connected to each other through contact between the positive and negative electrodes thereof after being assembled together. Electrical components in each building block sheet are powered by the positive and negative electrode conductive frames, which replaces the internal electrical connection layout realized entirely by conductive wires, can reduce or even completely eliminate the use of conductive wires, and can also reduce or even avoid electrical contacts such as solder joints accordingly, so that the internal electrical connection structure of the building block sheet is simple and reliable. The electrical connection structure is not prone to failure even in the event of collision, dropping or the like during play. Furthermore, the building block sheet is also easier to assemble, which can improve production efficiency.

[0102] In the embodiment, the shell is in a rectangular sheet shape, and each edge portion of the shell is provided with a pair of positive electrode and negative electrode, so that each edge portion can be available for assembling with other building block sheets to realize electrical connection, which offers more assembly possibilities and enhances playability.

[0103] Further, two magnetic attraction members are also embedded at each edge portion of the shell, and the pair of positive electrode and negative electrode are respectively disposed at two sides of the magnetic attraction members, i.e., near the corner portions of the shell, such that a relatively large spacing distance is formed between the pair of positive and negative electrodes. By virtue of the polarity arrangement of the magnetic attraction members, when any two side edges of two building block sheets are magnetically assembled together, the

corresponding magnetic attraction members are accurately aligned to generate an attraction force, which allows the positive and negative electrodes of the two building block sheets to be automatically aligned with each other for contact and conduction, that is to say, physical assembly and circuit conduction are completed synchronously through magnetic attraction, thus realizing an intelligent interactive experience of power-on upon assembling and improving the user experience.

[0104] Further, since each edge portion of the shell is provided with two magnetic attraction member accommodating grooves, each magnetic attraction member is snap-fitted in the accommodating groove between the base and the cover plate, improving the positioning accuracy of the installation positions of the magnetic attraction members and ensuring controllable direction during magnetic assembling.

[0105] Further, when the electrical connection assembly is installed in the inner cavity of the shell, the positive electrodes and the negative electrodes are embedded in the corresponding clamping grooves, forming a mechanical interlock between the electrodes and the shell. The fitting between the rear end structures of the electrodes and the clamping grooves restricts lateral displacement of the terminals, so that the contact regions of the electrodes are always stably exposed outside the shell. The double locking of the clamping grooves and the electrode accommodating notches can enhance the installation stability of the assembly.

[0106] Further, the three surfaces at the front ends of the positive electrodes and the negative electrodes are exposed outward from the corresponding notches in the shell and are located further outward relative to the corresponding facets (outer surfaces) of the shell, so that electrode contact between two building block sheets is easier to achieve, and the two building block sheets can be assembled at any angle with their corresponding electrodes in effective contact, thereby enabling a higher degree of freedom in building. Multiple building block sheets can be assembled into various planar shapes and three-dimensional shapes, with good playability and better reliability of electrode contact. Even the building block sheets are assembled into various shapes, light can be stably emitted.

[0107] Further, the positive electrode conductive frame, the isolation frame, and the negative electrode conductive frame are stacked in sequence, the frames have the shapes matching the shape of the shell and are fitted into the shell, and the relative fixation and positioning between the conductive frames and the isolation frame are realized through the fit between the positioning columns and the positioning holes, so that the electrical connection assembly has high reliability, preventing the positive electrodes from contacting the negative electrode conductive frame and the negative electrodes from contacting the positive electrode conductive frame, and the electrical connection assembly is not prone to displacement or deformation even when the building block sheet is bumped or dropped. In addition, since the three stacked frames have certain strength and the block-shaped electrodes also have certain

strength, certain supporting effect can be provided for the shell and the cover plate, making the overall strength of the building block sheet higher.

[0108] Further, the positive electrode conductive frame and the negative electrode conductive frame are respectively provided with the protrusions for positive electrode contact and the protrusions for negative electrode contact, and the isolation frame is provided with the positive electrode fitting grooves and negative electrode fitting grooves which are matched with the corresponding protrusions, so that during assembly, the electrical connection between the light-emitting devices and the positive and negative electrode conductive frames can be realized simply by fitting the positive connection terminals of the light-emitting devices into the positive electrode fitting grooves to enable the positive connection terminals to contact with the protrusions for positive electrode contact, and fitting the negative connection terminals into the negative electrode fitting grooves to enable the negative connection terminals to contact with the protrusions for negative electrode contact, and there is no need to form electrical connection contacts by means of welding or the like, which reduces costs and greatly improves production efficiency. In addition, the electrical devices in the building block sheet can be conveniently adjusted and replaced as required.

[0109] Further, the positive or negative connection terminals of the power supply rack are in direct contact with the surfaces of the positive or negative electrode conductive frames in one-to-one correspondence, respectively, and a conductive path is formed by means of conductive plating layers of the conductive frames to trigger the light-emitting units to light up. The current accomplishes a circuit loop in a sequence of the positive terminal → the positive electrode conductive frame → the positive connection terminal → the light-emitting unit → the negative connection terminal → the negative electrode conductive frame → the negative terminal, thereby triggering the light-emitting units to light up. The modular design enables the light-emitting devices together with the power supply rack to be directly embedded into the cavity of the shell and clamped and fixed on the electrical connection assembly. During assembly, circuit integration can be completed simply by aligning the connection terminals of the power supply rack with the contact surfaces of the conductive frames. The rigid contact between the power supply rack and the conductive frames can reduce the risk of disconnection caused by shaking of the building block sheet, and form a uniform and stable light source output inside the transparent building block sheet.

[0110] Further, the plurality of positive electrodes are integrally formed with the positive electrode conductive frame, and the plurality of negative electrodes are integrally formed with the negative electrode conductive frame. Moreover, the positive and negative electrode conductive frames are manufactured by plating a metal conductive layer on the surface of a non-metallic material, which not only facilitates the processing of such relatively complex frame structures, but also reduces the costs and the weight of the building block sheet.

[0111] Further, the overall structure of the positive electrode conductive frame and the positive electrodes is completely consistent with that of the negative electrode conductive frame and the negative electrodes, so that they can be manufactured using the same equipment and method (for example, the same mold), thereby further reducing the production costs of the product, improving production and assembly efficiency, and shortening the production cycle.

[0112] Embodiment 2

[0113] The present embodiment provides a building block sheet and a building block toy. In the present embodiment, the same reference numerals are assigned to the same constituent elements as those in Embodiment 1, and the corresponding descriptions are omitted.

[0114] FIG. 6 is a three-dimensional view of a building block sheet in the present embodiment, FIG. 7 is a schematic diagram of breakdown structures of the building block sheet in the present embodiment, FIG. 8 is a schematic diagram of breakdown structures of an electrical connection assembly and a functional assembly in the present embodiment, and FIG. 9 is a local sectional view of the building block sheet in the present embodiment.

[0115] As shown in FIG. 6 to FIG. 9, compared with Embodiment 1, the difference lies in that the distribution of the electrodes in the building block sheet of the present embodiment is different, and accordingly, the structure of the shell is different.

[0116] Specifically, in the building block sheet of the present embodiment, the shell 1 is also in a rectangular sheet shape, and each edge portion thereof is also provided with a pair of electrode accommodating notches and two magnetic attraction member accommodating portions 9. The difference is that the two magnetic attraction member accommodating portions are disposed closer to the two corner portions connected to the edge portion, and the pair of electrode accommodating notches are located between the two magnetic attraction member accommodating portions 9 of the edge portion, i.e., in the middle of the edge portion and arranged close to each other. Accordingly, a plurality of pairs of positive electrodes 51 and negative electrodes 52 are exposed from the middles of the edge portions of the shell 1. In the electrical connection assembly 4, each positive electrode 51 extends outward from the middle of one edge portion of the positive electrode conductive frame 41, and each negative electrode 52 extends outward from the middle of one edge portion of the negative electrode conductive frame 43.

[0117] In the present embodiment, other structures are the same as those in Embodiment 1, and thus the descriptions thereof will not be repeated herein.

[0118] Functions and effects of Embodiment 2

[0119] According to the building block sheet and the building block toy provided in the present embodiment, similar to Embodiment 1, since each of the edge portions of the building block sheet is provided with a pair of exposed electrodes, a plurality of building block sheets can be

assembled together at any angle, and the electrodes can be stably contacted with each other for conducting.

[0120] Embodiment 3

[0121] The present embodiment provides a building block sheet and a building block toy. In the present embodiment, the same reference numerals are assigned to the same constituent elements as those in Embodiment 2, and the corresponding descriptions are omitted.

[0122] FIG. 10 is a three-dimensional view of an electrical connection assembly in the present embodiment, FIG. 11 is a schematic sectional view of a front side of the electrical connection assembly in the present embodiment, and FIG. 12 is a schematic structural view of a back side of the electrical connection assembly in the present embodiment.

[0123] As shown in FIG. 10 to FIG. 12, compared with Embodiment 2, the difference lies in that the structure of the electrical connection assembly 4 in the building block sheet of the present embodiment is different.

[0124] In the electrical connection assembly 4 of the present embodiment, the isolation frame 42 is a wiring board 402. Both the positive electrode conductive frame 41 and the negative electrode conductive frame 43 are conductive layers formed on the front side and the back side of the isolation frame 42, which may be, for example, aluminum foil or copper foil layers formed by spraying. That is to say, the positive electrode conductive frame 41, the isolation frame 42, and the negative electrode conductive frame 43 are integrally formed and laid along the contour (surface shape) of the isolation frame 42.

[0125] Only a part of the conductive layer of the negative electrode conductive frame 43 is disposed on the back side of the isolation frame 42 (the wiring board 402), and the part of the conductive layer of the negative electrode conductive frame 43 located on the back side passes through the wiring board and is connected to another part of the conductive layer of the negative electrode conductive frame 43 located on the front side of the isolation frame. The conductive layer of the positive electrode conductive frame 41 and a part of the conductive layer of the negative electrode conductive frame 43 form two independent conductive units.

[0126] In addition, the power supply rack 161 of the functional assembly 6 is also integrally formed on the inner side of the isolation frame 42, and a plurality of light-emitting devices 162 are connected to the power supply rack 161.

[0127] In the present embodiment, other structures are the same as those in Embodiment 2, and thus the descriptions thereof will not be repeated herein.

[0128] Functions and effects of Embodiment 3

[0129] According to the building block sheet and the building block toy provided in the present embodiment, on the basis of the functions and effects of Embodiment 2, the isolation frame and the power supply rack are integrally formed, and the positive electrode conductive frame and the negative electrode conductive frame are integrally formed on the isolation frame by spraying, forming a double-sided conductive integrated structure, so that on the premise that

the same electrical connection effect can be achieved, the volume of the electrical connection assembly is further reduced compared with the split-type design, enabling the building block sheet to be thinner; and moreover, during assembly, the electrical connection assembly and the functional assembly may be conveniently and quickly assembled as an integral component, and can be more easily assembled into the cavity of the shell, so that the assembly efficiency can be improved, and the production cycle is further shortened.

[0130] Embodiment 4

[0131] The present embodiment provides a building block sheet and a building block toy. In the present embodiment, the same reference numerals are assigned to the same constituent elements as those in Embodiment 1, and the corresponding descriptions are omitted.

[0132] FIG. 13 is a schematic diagram of breakdown structures of a building block sheet in the present embodiment.

[0133] As shown in FIG. 13, the building block sheet of the present embodiment is a power supply building block sheet. Compared with the functional building block sheet of Embodiment 1, the difference lies in that the structure and function of the functional assembly 6 are different, and accordingly, the structure of the shell 1 is also different.

[0134] In the present embodiment, the functional assembly 6 is a battery assembly (i.e., a power supply device), which is installed in the cavity 3 of the shell 1 and located at the inner side of the electrical connection assembly 4. The functional assembly 6 includes an electrical storage device 61 (i.e., an electrical storage board) and a circuit board 62.

[0135] The circuit board 62 is electrically connected to the electrical storage device 61. A plurality of buttons 63 and a charging interface 64 are disposed on the circuit board 62.

[0136] The plurality of buttons 63 include a switch button 631 (i.e., a first button) and a function button 632 (i.e., a second button). Pressing the switch button 631 enables power conduction to be turned on or off, and pressing the function button 632 can control the brightness of the light-emitting devices 162 and is used for cutting off the power supply. Two button clearance holes 124 (i.e., first clearance holes) are correspondingly formed in the cover plate 12 at positions corresponding to the two buttons 63. The switch button 631 and the function button 632 respectively pass through the two button clearance holes 124 in one-to-one correspondence, and upper ends of the buttons are exposed outside the cover plate 12.

[0137] The charging interface 64 is configured to connect a charging cable to replenish energy for (to charge) the electrical storage device 61. In the present embodiment, the charging interface 64 is a Type-C standard interface. An interface clearance hole 125 (i.e., a clearance hole II) is formed in the cover plate 12 at a position corresponding to the charging interface 64.

[0138] The electrical storage device 61 and the circuit board 62 are fixed in the cavity 3 of the shell 1, and the positive electrodes and the negative electrodes of the circuit board 62 are electrically connected to the positive electrode conductive frame 41 and the negative electrode conductive frame 43 of the electrical connection assembly 4, respectively, forming a power

supply circuit. When the switch button 631 is pressed, the circuit board 62 is triggered to be connected, current flows from the electrical storage device 61 to the circuit board 62, the positive electrode conductive frame 41 and the negative electrode conductive frame 43 cooperate with the conductive paths of adjacent building block sheets for current transmission to drive the light-emitting devices in the adjacent building block sheets to operate. When the function button 632 is pressed, the circuit is cut off for disconnection. The electrical storage device 61 can be charged when the charging interface 64 is connected to an external plug.

[0139] In the present embodiment, other structures are the same as those in Embodiment 1, and thus the descriptions thereof will not be repeated herein. The power supply building block sheet of the present embodiment may be used in combination with the functional building block sheet of Embodiment 1.

[0140] Functions and effects of Embodiment 4

[0141] According to the building block sheet and the building block toy provided in the present embodiment, on the basis of some functions and effects of Embodiment 1, the electrical storage device and the circuit board are disposed at the inner side of the electrical connection assembly, and the positive electrodes and the negative electrodes of the circuit board are electrically connected to the positive electrode conductive frame and the negative electrode conductive frame, respectively, so that the power supply circuit can be formed, making the building block sheet become a power supply building block sheet capable of supplying power to other building block sheets. Children do not need to connect the functional building sheet to an external battery when playing, and only need to assemble the power supply building sheets together like assembling other building block sheets, making it more convenient to use.

[0142] Further, the circuit board is provided with the switch button, the function button, and the charging interface, and the corresponding clearance holes are formed in the cover plate to expose these components. Pressing the switch button triggers the circuit board to be conducted or disconnected. When in connection, current flows from the electrical storage device to the circuit board, and the positive electrode conductive frame and the negative electrode conductive frame cooperate with the conductive paths of adjacent building block sheets for current transmission to drive the electrical devices in the adjacent building block sheets to operate. Pressing the function button can realize corresponding functions, such as switching the brightness of the light-emitting devices. When the charging interface is connected to an external plug, the electrical storage device can be charged through the circuit board. That is to say, the power supply building block sheet of the present embodiment integrates power supply, charging, and control functions into a single building block sheet, realizing continuous power supply and flexible start-stop of a building block system including a power supply building block sheet and a plurality of functional building block sheets. Furthermore, the modular design ensures the convenience of disassembly, assembly and maintenance, and improves the functional expandability and use convenience of the building block system.

[0143] Embodiment 5

[0144] The present embodiment provides a building block sheet and a building block toy. In the present embodiment, the same reference numerals are assigned to the same constituent elements as those in Embodiment 1, and the corresponding descriptions are omitted.

[0145] Compared with Embodiment 1, the difference lies in that in the building block sheet of the present embodiment, the functional assembly 6 includes a sound production device (i.e., a sound production apparatus) or an acousto-optic device (e.g., a display screen). The sound production device can produce sound after being powered on, and the display screen can display numbers or patterns. In an alternative solution, the functional assembly 6 may also simultaneously include combinations of any several of the light-emitting device, the sound production device, and the acousto-optic device.

[0146] Functions and effects of Embodiment 5

[0147] According to the building block sheet and the building block toy provided in the present embodiment, on the basis of the functions and effects of Embodiment 1, since the functional assembly may also include the sound production device and the acousto-optic device, more functionality and playability are provided.

[0148] Embodiment 6

[0149] The present embodiment provides a building block sheet and a building block toy. In the present embodiment, the same reference numerals are assigned to the same constituent elements as those in Embodiment 1, and the corresponding descriptions are omitted.

[0150] FIG. 14 is a three-dimensional view of an electrical connection assembly and a functional assembly in the present embodiment, and FIG. 15 is a schematic diagram of breakdown structures of the electrical connection assembly and the functional assembly in the present embodiment.

[0151] As shown in FIG. 14 and FIG. 15, compared with Embodiment 1, the difference lies in that the configuration of the functional assembly 6 in the building block sheet of the present embodiment is different.

[0152] Specifically, in the functional assembly 6 of the present embodiment, the power supply rack 161 is a rectangular transparent frame, in which the light-emitting devices 162 are arranged, and in a plane direction of the building block sheet, an area of the functional assembly 6 accounts for 80% or more in the plane of the cavity 3, so that the light emitting region accounts for a relatively large proportion, and a better light emitting effect can be obtained.

[0153] The power supply rack 161 can be snap-fitted at the inner side of the isolation frame 42, and the positive connection terminals 17 and the negative connection terminals 18 are designed as bumps, both of which protrude on the same side wall of the power supply rack 161 and are arranged at intervals along a length direction of the side wall of the power supply rack 161. The isolation frame 42 has a π-shaped frame body, which is a square frame body missing

one edge side, so that a clearance cavity 300 is reserved between the positive electrode conductive frame 41 and the negative electrode conductive frame 43 after they are mounted. The protrusions 411 for positive electrode contact (i.e., positive contact protrusions) are provided on the middle of one edge portion of the positive electrode conductive frame 41, and the protrusions 431 for negative electrode contact (i.e., negative contact protrusions) are provided on the middle of one edge portion of the negative electrode conductive frame 43. Both the protrusions 411 for positive electrode contact and the protrusions 431 for negative electrode contact extend toward the clearance cavity 300. When side portions of the power supply rack 161 are clamped into the clearance cavity, the positive connection terminals 17 and the negative connection terminals 18 are in contact with the protrusions 411 for positive electrode contact and the protrusions 431 for negative electrode contact in one-to-one correspondence, respectively.

[0154] Due to process constraints, the interior of the power supply rack 161 on this side (i.e., the side with the positive connection terminals 17 and the negative connection terminals 18) does not allow for the arrangement of the light-emitting devices 162, resulting in a non-light-emitting portion on this side. To avoid affecting the aesthetic appearance, the non-light-emitting edge is embedded into the clearance cavity, and the positive electrode conductive frame 41 and the negative electrode conductive frame 43 at two sides of the clearance cavity are configured to jointly shield and conceal the non-light-emitting portion, the positive connection terminals, and the negative connection terminals of the power supply rack 161, thereby improving aesthetic appeal of the appearance of the building block sheet.

[0155] Functions and effects of Embodiment 6

[0156] According to the building block sheet and the building block toy provided in the present embodiment, on the basis of some functions and effects of Embodiment 1, due to the rectangular transparent frame used for the power supply rack, almost all the space at the inner sides of the conductive frames and the isolation frame can be used for arranging the power supply rack and the light-emitting devices, thus obtaining a larger light-emitting region and making the building block sheet better in light-emitting effect.

[0157] Further, since the non-light-emitting portion and the positive and negative connection terminals of the power supply rack are concealed by means of the positive electrode conductive frame and the negative electrode conductive frame, the overall appearance of the building block sheet is aesthetically pleasing.

[0158] Modified Example 1

[0159] The present modified example is a modification of Embodiment 1. In the present modified example, the same reference numerals are assigned to the same constituent elements as those in Embodiment 1, and the corresponding descriptions are omitted.

[0160] FIG. 16 is a schematic diagram of breakdown structures of a building block sheet in the present modified example.

[0161] As shown in FIG. 16, compared with Embodiment 1, the difference lies in that in the building block sheet of the present modified example, the shape of the power supply rack 161 is rectangular, which is smaller in size than the conductive frames and the isolation frame, and is disposed in the middle of the cavity 3. The power supply rack 161 is provided with one positive connection terminal 17 and one negative connection terminal 18. The positive connection terminal 17 and the negative connection terminal 18 are respectively located in the middles of two opposite sides of the power supply rack 161 and extend outward. The plurality of light-emitting devices 162 are arranged along the rectangular contour of the power supply rack 161.

[0162] Accordingly, the positive electrode fitting grooves 421 in the isolation frame 42 are provided corresponding to the positive connection terminals 17, and the protrusions 411 for positive electrode contact on the positive electrode conductive frame 41 are also provided corresponding to the positive connection terminals 17. The negative electrode fitting grooves 422 in the isolation frame 42 are provided corresponding to the negative connection terminals 18, and the protrusions 431 for negative electrode contact on the negative electrode conductive frame 43 are also provided corresponding to the negative connection terminals 18.

[0163] In the present modified example, other structures are the same as those in Embodiment 1.

[0164] Modified Example 2

[0165] The present modified example is a modification of Embodiment 1. In the present modified example, the same reference numerals are assigned to the same constituent elements as those in Embodiment 1, and the corresponding descriptions are omitted.

[0166] FIG. 17 is a schematic diagram of breakdown structures of a building block sheet in the present modified example.

[0167] As shown in FIG. 17, compared with Embodiment 1, the difference lies in that in the building block sheet of the present modified example, the power supply rack 161 is cross-shaped, with four symmetrically extending rack body portions (i.e., subsections) being naturally formed. The power supply rack 161 is correspondingly provided with two positive connection terminals 17 and two negative connection terminals 18, and each of the connection terminals is distributed at a corresponding position of the cross-shaped structure to ensure the balance of electrical connection. The two positive connection terminals 17 are located at ends of two of the rack body portions, and the two negative connection terminals 18 are correspondingly located at ends of the other two subsections. The plurality of light-emitting devices 162 are respectively disposed on the four rack body portions of the power supply rack 161.

[0168] The protrusions 411 for positive electrode contact on the positive electrode conductive frame 41 are disposed in the middles of two edge portions of the positive electrode conductive frame 41, and the protrusions 431 for negative electrode contact on the negative electrode conductive frame 43 are disposed in the middles of two edge portions of the negative electrode

conductive frame 43. The positive electrode fitting grooves 421 and the negative electrode fitting grooves 422 in the isolation frame 42 are correspondingly provided in the middles of the edge portions of the isolation frame 42, respectively. The positive connection terminals 17 and the negative connection terminals 18 of the power supply rack 161 are fitted into the corresponding fitting grooves, so that the four rack body portions are aligned with a length direction and a width direction of the shell 1, respectively.

[0169] In the present modified example, other structures are the same as those in Embodiment 1.

[0170] Modified Example 3

[0171] The present modified example is a modification of Embodiment 1. In the present modified example, the same reference numerals are assigned to the same constituent elements as those in Embodiment 1, and the corresponding descriptions are omitted.

[0172] FIG. 18 is a schematic diagram of breakdown structures of a building block sheet in the present modified example.

[0173] As shown in FIG. 18, compared with Embodiment 1, the difference lies in that in the building block sheet of the present modified example, the power supply rack 161 is rhombus-shaped and is symmetrically provided with two positive connection terminals 17 and two negative connection terminals 18. The two positive connection terminals 17 are located at corner positions of one pair of diagonal vertices of the power supply rack 161, and the two negative connection terminals 18 are correspondingly located at corner positions of the other pair of diagonal vertices thereof. The plurality of light-emitting devices 162 are arranged along the rhombic contour of the power supply rack 161.

[0174] The protrusions 411 for positive electrode contact on the positive electrode conductive frame 41 are disposed in the middles of two edge portions of the positive electrode conductive frame 41, and the protrusions 431 for negative electrode contact on the negative electrode conductive frame 43 are disposed in the middles of two edge portions of the negative electrode conductive frame 43. The positive electrode fitting grooves 421 and the negative electrode fitting grooves 422 in the isolation frame 42 are correspondingly provided in the middles of the edge portions of the isolation frame 42, respectively. The positive connection terminals 17 and the negative connection terminals 18 of the power supply rack 161 are fitted into the corresponding fitting grooves, so that the corner portions of the power supply rack 161 are located in the middles of the corresponding edge portions of the conductive frames, respectively.

[0175] In the present modified example, other structures are the same as those in Embodiment 1.

[0176] Modified Example 4

[0177] The present modified example is a modification of Embodiment 1. In the present modified example, the same reference numerals are assigned to the same constituent elements as those in Embodiment 1, and the corresponding descriptions are omitted.

[0178] FIG. 19 is a schematic diagram of breakdown structures of a building block sheet in the present modified example.

[0179] As shown in FIG. 19, compared with Embodiment 1, the difference lies in that in the building block sheet of the present modified example, the shell 1 is in the shape of an equilateral triangular sheet, and three edge sides thereof are equal in length.

[0180] The positive electrode conductive frame 41, the isolation frame 42, and the negative electrode conductive frame 43 are equilateral triangular frame bodies matching the shell 1.

[0181] The power supply rack 161 is in a three-branched shape with three elongated rack body portions extending from a center, and the plurality of light-emitting devices 162 are respectively disposed on the rack body portions.

[0182] In the present modified example, other structures are the same as those in Embodiment 1.

[0183] Modified Example 5

[0184] The present modified example is a modification of Embodiment 1. In the present modified example, the same reference numerals are assigned to the same constituent elements as those in Embodiment 1, and the corresponding descriptions are omitted.

[0185] FIG. 20 is a schematic diagram of breakdown structures of a building block sheet in the present modified example.

[0186] As shown in FIG. 20, compared with Embodiment 1, the difference lies in that in the building block sheet of the present modified example, the shell 1 is in the shape of an equilateral triangular sheet.

[0187] The positive electrode conductive frame 41, the isolation frame 42, and the negative electrode conductive frame 43 are equilateral triangular frame bodies matching the shell 1.

[0188] The power supply rack 161 is in an equilateral triangular shape corresponding to the shell 1, and the plurality of light-emitting devices 162 are arranged along the triangular contour of the power supply rack 161.

[0189] In the present modified example, other structures are the same as those in Embodiment 1.

[0190] Modified Example 6

[0191] The present modified example is a modification of Embodiment 1. In the present modified example, the same reference numerals are assigned to the same constituent elements as those in Embodiment 1, and the corresponding descriptions are omitted.

[0192] FIG. 21 is a schematic diagram of breakdown structures of a building block sheet in the present modified example.

[0193] As shown in FIG. 21, compared with Embodiment 1, the difference lies in that in the building block sheet of the present modified example, the shell 1 is in the shape of an elongated triangular sheet, and two relatively long edge sides thereof are equal in length.

[0194] The positive electrode conductive frame 41, the isolation frame 42, and the negative electrode conductive frame 43 are elongated triangular frame bodies matching the shell 1.

[0195] The power supply rack 161 is in a three-branched shape with three elongated rack body portions extending from a center, and the plurality of light-emitting devices 162 are respectively disposed on the rack body portions.

[0196] In the present modified example, other structures are the same as those in Embodiment 1.

[0197] Modified Example 7

[0198] The present modified example is a modification of Embodiment 1. In the present modified example, the same reference numerals are assigned to the same constituent elements as those in Embodiment 1, and the corresponding descriptions are omitted.

[0199] FIG. 22 is a schematic diagram of breakdown structures of a building block sheet in the present modified example.

[0200] As shown in FIG. 22, compared with Embodiment 1, the difference lies in that in the building block sheet of the present modified example, the shell 1 is in the shape of a right triangular sheet.

[0201] The positive electrode conductive frame 41, the isolation frame 42, and the negative electrode conductive frame 43 are right triangular frame bodies matching the shell 1.

[0202] The power supply rack 161 is in a right triangular shape corresponding to the shell 1, and the plurality of light-emitting devices 162 are arranged along the triangular contour of the power supply rack 161.

[0203] In the present modified example, other structures are the same as those in Embodiment 1.

[0204] Modified Example 8

[0205] The present modified example is a modification of Embodiment 1. In the present modified example, the same reference numerals are assigned to the same constituent elements as those in Embodiment 1, and the corresponding descriptions are omitted.

[0206] FIG. 23 is a schematic diagram of breakdown structures of a building block sheet in the present modified example.

[0207] As shown in FIG. 23, compared with Embodiment 1, the difference lies in that in the building block sheet of the present modified example, the shell 1 is in the shape of a petal-shaped sheet, i.e., a triangular sheet that is integrally bent, and has three edge sides, one of the edge sides is a straight side, and the other two edge sides are curved sides.

[0208] The positive electrode conductive frame 41, the isolation frame 42, and the negative electrode conductive frame 43 are triangular frame bodies which are integrally bent and matched with the shell 1.

[0209] The power supply rack 161 is in a three-branched shape with three elongated rack body portions extending from a center, and has a curvature matching the shell 1. The plurality of light-emitting devices 162 are respectively disposed on the rack body portions.

[0210] In the present modified example, other structures are the same as those in Embodiment 1.

[0211] Modified Example 9

[0212] The present modified example is a modification of Embodiment 1. In the present modified example, the same reference numerals are assigned to the same constituent elements as those in Embodiment 1, and the corresponding descriptions are omitted.

[0213] FIG. 24 is a schematic diagram of breakdown structures of a building block sheet in the present modified example.

[0214] As shown in FIG. 24, compared with Embodiment 1, the difference lies in that in the building block sheet of the present modified example, the shell 1 is in the shape of a rectangular sheet.

[0215] The positive electrode conductive frame 41, the isolation frame 42, and the negative electrode conductive frame 43 are rectangular frame bodies matching the shell 1.

[0216] The power supply rack 161 is in a rectangular shape corresponding to the shape of the shell 1, with a positive connection terminal 17 and a negative connection terminal 18 respectively extending outward from the middles of two ends in a length direction of the rectangle, and the plurality of light-emitting devices 162 are arranged along the rectangular contour of the power supply rack 161.

[0217] In the present modified example, other structures are the same as those in Embodiment 1.

[0218] Modified Example 10

[0219] The present modified example is a modification of Embodiment 1. In the present modified example, the same reference numerals are assigned to the same constituent elements as those in Embodiment 1, and the corresponding descriptions are omitted.

[0220] FIG. 25 is a schematic diagram of breakdown structures of a building block sheet in the present modified example.

[0221] As shown in FIG. 25, compared with Embodiment 1, the difference lies in that in the building block sheet of the present modified example, the shell 1 is in the shape of a pentagonal sheet with five edge sides of equal length.

[0222] The positive electrode conductive frame 41, the isolation frame 42, and the negative electrode conductive frame 43 are pentagonal frame bodies matching the shell 1.

[0223] The power supply rack 161 is in a five-pointed star shape corresponding to the shape of the shell 1, with the positive connection terminals 17 or the negative connection terminals 18 respectively extending outward from the corner portions of the five-pointed star. The plurality of light-emitting devices 162 are arranged along the five-pointed star contour of the power supply rack 161.

[0224] In the present modified example, other structures are the same as those in Embodiment 1.

[0225] Modified Example 11

[0226] The present modified example is a modification of Embodiment 1. In the present modified example, the same reference numerals are assigned to the same constituent elements as those in Embodiment 1, and the corresponding descriptions are omitted.

[0227] FIG. 26 is a schematic diagram of breakdown structures of a building block sheet in the present modified example.

[0228] As shown in FIG. 26, compared with Embodiment 1, the difference lies in that in the building block sheet of the present modified example, the shell 1 is in the shape of a hexagonal sheet.

[0229] The positive electrode conductive frame 41, the isolation frame 42, and the negative electrode conductive frame 43 are hexagonal frame bodies matching the shell 1.

[0230] The power supply rack 161 is in a six-pointed star shape corresponding to the shape of the shell 1, with the positive connection terminals 17 or the negative connection terminals 18 respectively extending outward from the corner portions of the six-pointed star. The plurality of light-emitting devices 162 are arranged along the six-pointed star contour of the power supply rack 161.

[0231] In the present modified example, other structures are the same as those in Embodiment 1.

[0232] Modified Example 12

[0233] The present modified example is a modification of Embodiment 1. In the present modified example, the same reference numerals are assigned to the same constituent elements as those in Embodiment 1, and the corresponding descriptions are omitted.

[0234] FIG. 27 is an exemplary view of a plurality of building block sheets assembled together in the present modified example.

[0235] As shown in FIG. 27, compared with Embodiment 1, the difference lies in that the building block toy of the present modified example includes a variety of building block sheets of different shapes, including the square building block sheet provided in Embodiment 1, the right triangular building block sheet provided in Modified Example 7, and a larger square building block sheet.

[0236] The side length of the larger square building block sheet is approximately twice that of the square building block sheet provided in Embodiment 1. Two pairs of the positive electrodes

51 and the negative electrodes 52 are arranged on each of the edge portions of the larger square building block sheet, and similar to Embodiment 1, magnetic attraction members 2 are disposed between each pair of the positive electrode 51 and the negative electrode 52 for isolation. The right-angle side length of the right triangular building block sheet is approximately equal to the side length of the square building block sheet provided in Embodiment 2.

[0237] Since each edge portion of the shell 1 of each of the various building block sheets described above is provided with at least one pair of electrodes 5 and magnetic attraction members 2, the building block sheets of different shapes can be freely assembled together through magnetic attraction to form diverse forms. During magnetic attraction assembly, conductive paths are established through the electrodes 5 at magnetic attraction positions. When an external power supply is connected, current can trigger the built-in functional assembly 6 through the electrode paths, thereby realizing the light-emitting function.

[0238] In the present modified example, other structures are the same as those in Embodiment 1.

[0239] Modified Example 13

[0240] The present modified example is a modification of Embodiment 1. In the present modified example, the same reference numerals are assigned to the same constituent elements as those in Embodiment 1, and the corresponding descriptions are omitted.

[0241] FIG. 28 is an exemplary view of a plurality of building block sheets assembled together in the present modified example.

[0242] As shown in FIG. 28, compared with Embodiment 1, the difference lies in that the building block toy of the present modified example includes a variety of building block sheets of different shapes, including the hexagonal building block sheet provided in Modified Example 11 and the petal-shaped building block sheet provided in Modified Example 8. The side length of the straight side of the petal-shaped building block sheet is approximately equal to that of the hexagonal building block sheet.

[0243] Since each edge portion of the shell 1 of each of the various building block sheets described above is provided with at least one pair of electrodes 5 and magnetic attraction members 2, the building block sheets of different shapes can be freely assembled together through magnetic attraction to form diverse forms. During magnetic attraction assembly, conductive paths are established through the electrodes 5 at magnetic attraction positions. When an external power supply is connected, current can trigger the built-in functional assembly 6 through the electrode paths, thereby realizing the light-emitting function.

[0244] In the present modified example, other structures are the same as those in Embodiment 1.

[0245] Modified Example 14

[0246] The present modified example is a modification of Embodiment 2. In the present modified example, the same reference numerals are assigned to the same constituent elements as those in Embodiment 2, and the corresponding descriptions are omitted.

[0247] FIG. 29 is a schematic diagram of breakdown structures of a building block sheet in the present modified example.

[0248] As shown in FIG. 29, compared with Embodiment 2, the difference lies in that in the present modified example, the shell 1 is in the shape of an equilateral triangular sheet.

[0249] The positive electrode conductive frame 41, the isolation frame 42, and the negative electrode conductive frame 43 are equilateral triangular frame bodies matching the shell 1.

[0250] The power supply rack 161 is in a three-branched shape with three elongated rack body portions extending from a center, and the plurality of light-emitting devices 162 are respectively disposed on the rack body portions.

[0251] In the present modified example, other structures are the same as those in Embodiment 2.

[0252] Modified Example 15

[0253] The present modified example is a modification of Embodiment 2. In the present modified example, the same reference numerals are assigned to the same constituent elements as those in Embodiment 2, and the corresponding descriptions are omitted.

[0254] FIG. 30 is a three-dimensional view of a building block sheet in the present modified example.

[0255] As shown in FIG. 30, compared with Embodiment 2, the difference lies in that in the present modified example, the shell 1 is in the shape of an elongated triangular sheet. The structures of the electrical connection assembly 4 and the functional assembly 6 may be referred to Modified Example 6.

[0256] In the present modified example, other structures are the same as those in Embodiment 2.

[0257] Modified Example 16

[0258] The present modified example is a modification of Embodiment 2. In the present modified example, the same reference numerals are assigned to the same constituent elements as those in Embodiment 2, and the corresponding descriptions are omitted.

[0259] FIG. 31 is a three-dimensional view of a building block sheet in the present modified example.

[0260] As shown in FIG. 31, compared with Embodiment 2, the difference lies in that in the present modified example, the shell 1 is in the shape of a right triangular sheet. The structures of the electrical connection assembly 4 and the functional assembly 6 may be referred to Modified Example 7.

[0261] In the present modified example, other structures are the same as those in Embodiment 2.

[0262] Modified Example 17

[0263] The present modified example is a modification of Embodiment 2. In the present modified example, the same reference numerals are assigned to the same constituent elements as those in Embodiment 2, and the corresponding descriptions are omitted.

[0264] FIG. 32 is a three-dimensional view of a building block sheet in the present modified example.

[0265] As shown in FIG. 32, compared with Embodiment 2, the difference lies in that in the present modified example, the shell 1 is in the shape of a petal-shaped sheet, i.e., a triangular sheet that is integrally bent, and has three edge sides, one of the edge sides is a straight side, and the other two edge sides are curved sides. The structures of the electrical connection assembly 4 and the functional assembly 6 may be referred to Modified Example 8.

[0266] In the present modified example, other structures are the same as those in Embodiment 2.

[0267] Modified Example 18

[0268] The present modified example is a modification of Embodiment 2. In the present modified example, the same reference numerals are assigned to the same constituent elements as those in Embodiment 2, and the corresponding descriptions are omitted.

[0269] FIG. 33 is a three-dimensional view of a building block sheet in the present modified example.

[0270] As shown in FIG. 33, compared with Embodiment 2, the difference lies in that in the present modified example, the shell 1 is in the shape of a rectangular sheet. A pair of the positive electrode 51 and the negative electrode 52 are arranged in the middle of each of two opposite edge portions of the rectangle. The structures of the electrical connection assembly 4 and the functional assembly 6 may be referred to Modified Example 9.

[0271] In the present modified example, other structures are the same as those in Embodiment 2.

[0272] Modified Example 19

[0273] The present modified example is a modification of Embodiment 2. In the present modified example, the same reference numerals are assigned to the same constituent elements as those in Embodiment 2, and the corresponding descriptions are omitted.

[0274] FIG. 34 is a schematic diagram of breakdown structures of a building block sheet in the present modified example.

[0275] As shown in FIG. 34, compared with Embodiment 2, the difference lies in that in the present modified example, the shell 1 is in the shape of a pentagonal sheet with five edge sides, and the edge sides are equal in length.

[0276] The positive electrode conductive frame 41, the isolation frame 42, and the negative electrode conductive frame 43 are pentagonal frame bodies matching the shell 1.

[0277] The power supply rack 161 is in a five-pointed star shape corresponding to the shape of the shell 1, with the positive connection terminals 17 and the negative connection terminals 18 respectively extending outward from the corner portions of the five-pointed star. The plurality of light-emitting devices 162 are arranged along the five-pointed star contour of the power supply rack 161.

[0278] In the present modified example, other structures are the same as those in Embodiment 2.

[0279] Modified Example 20

[0280] The present modified example is a modification of Embodiment 2. In the present modified example, the same reference numerals are assigned to the same constituent elements as those in Embodiment 2, and the corresponding descriptions are omitted.

[0281] FIG. 35 is a schematic diagram of breakdown structures of a building block sheet in the present modified example.

[0282] As shown in FIG. 35, compared with Embodiment 2, the difference lies in that in the present modified example, the shell 1 is in the shape of a hexagonal sheet with six edge sides, and the edge sides are equal in length.

[0283] The positive electrode conductive frame 41, the isolation frame 42, and the negative electrode conductive frame 43 are hexagonal frame bodies matching the shell 1.

[0284] The power supply rack 161 is in a six-pointed star shape corresponding to the shape of the shell 1, with the positive connection terminals 17 and the negative connection terminals 18 respectively extending outward from the corner portions of the six-pointed star. The plurality of light-emitting devices 162 are arranged along the six-pointed star contour of the power supply rack 161.

[0285] In the present modified example, other structures are the same as those in Embodiment 2.

[0286] Modified Example 21

[0287] The present modified example is a modification of Embodiment 2. In the present modified example, the same reference numerals are assigned to the same constituent elements as those in Embodiment 2, and the corresponding descriptions are omitted.

[0288] FIG. 36 is an exemplary view of a plurality of building block sheets assembled together in the present modified example.

[0289] As shown in FIG. 36, compared with Embodiment 2, the difference lies in that the building block toy of the present modified example includes a variety of building block sheets of different shapes, including the square building block sheet provided in Embodiment 2, the right triangular building block sheet provided in Modified Example 16, and a larger square building block sheet.

[0290] The side length of the larger square building block sheet is approximately twice that of the square building block sheet provided in Embodiment 2. Two pairs of the positive electrodes

51 and the negative electrodes 52 are arranged on each of the edge portions of the larger square building block sheet, and each pair of the positive electrode 51 and the negative electrode 52 are arranged close to each other, similarly to Embodiment 2. The right-angle side length of the right triangular building block sheet is approximately equal to the side length of the square building block sheet provided in Embodiment 1.

[0291] Since each edge portion of the shell 1 of each of the various building block sheets described above is provided with at least one pair of electrodes 5 and magnetic attraction members 2, the building block sheets of different shapes can be freely assembled together through magnetic attraction to form diverse forms. During magnetic attraction assembly, conductive paths are established through the electrodes 5 at magnetic attraction positions. When an external power supply is connected, current can trigger the built-in functional assembly 6 through the electrode paths, thereby realizing the light-emitting function.

[0292] In the present modified example, other structures are the same as those in Embodiment 2.

[0293] Modified Example 22

[0294] The present modified example is a modification of Embodiment 2. In the present modified example, the same reference numerals are assigned to the same constituent elements as those in Embodiment 2, and the corresponding descriptions are omitted.

[0295] FIG. 37 is an exemplary view of a plurality of building block sheets assembled together in the present modified example.

[0296] As shown in FIG. 37, compared with Embodiment 2, the difference lies in that the building block toy of the present modified example includes a variety of building block sheets of different shapes, including the hexagonal building block sheet provided in Modified Example 20 and the petal-shaped building block sheet provided in Modified Example 17. The side length of the straight side of the petal-shaped building block sheet is approximately equal to that of the hexagonal building block sheet.

[0297] Since each edge portion of the shell 1 of each of the various building block sheets described above is provided with at least one pair of electrodes 5 and magnetic attraction members 2, the building block sheets of different shapes can be freely assembled together through magnetic attraction to form diverse forms. During magnetic attraction assembly, conductive paths are established through the electrodes 5 at magnetic attraction positions. When an external power supply is connected, current can trigger the built-in functional assembly 6 through the electrode paths, thereby realizing the light-emitting function.

[0298] In the present modified example, other structures are the same as those in Embodiment 2.

[0299] Modified Example 1 to Modified Example 13 described above are all modifications of Embodiment 1, and Modified Example 14 to Modified Example 22 described above are all

modifications of Embodiment 2, but these modifications may also be applied in combination with Embodiment 3 to Embodiment 6.

[0300] The above-mentioned embodiments are only used for illustrating the specific implementation manners of the present invention, and the present invention is not limited to the description scope of the above embodiments. It should be understood by those skilled in the art that the present invention is not limited to the above embodiments, and the descriptions in the above embodiments and the specification only illustrate the principles of the present invention. Without departing from the spirit and scope of the present invention, the present invention may have various changes and improvements, and these changes and improvements all fall within the scope of the present invention as claimed. The scope of protection claimed by the present invention is defined by the appended claims and equivalents thereof.

What is claimed is:

1. A building block sheet, characterized by comprising:

a shell, comprising a base and a cover plate matched with the base;

an electrical connection assembly, arranged on the base; and

a functional assembly, electrically connected by the electrical connection assembly,

wherein the electrical connection assembly comprises a positive electrode conductive frame and one or more positive electrodes arranged on the positive electrode conductive frame, a negative electrode conductive frame and one or more negative electrodes arranged on the negative electrode conductive frame,

the functional assembly is in contact with the positive electrode conductive frame and the negative electrode conductive frame respectively,

the shell is provided with one or more edge portions for contacting other building block sheets, the edge portions are provided with a plurality of electrode accommodating notches, and

the positive electrodes and the negative electrodes are respectively disposed in the corresponding electrode accommodating notches.

2. The building block sheet according to claim 1, characterized in that:

wherein the edge portions have a plurality of facets, and

the positive electrodes and the negative electrodes both have a plurality of contact surfaces corresponding to the facets of the edge portions, and the contact surfaces are exposed from the corresponding electrode accommodating notches to the outside of the corresponding facets.

3. The building block sheet according to claim 1, characterized in that:

wherein the edge portions have curved surfaces, and

the positive electrodes and the negative electrodes both have contact surfaces corresponding to the curved surfaces of the edge portions, and the contact surfaces are exposed from the corresponding electrode accommodating notches to the outside of the curved surfaces.

4. The building block sheet according to claim 1, characterized in that:

wherein the shell is provided with a plurality of clamping grooves corresponding to the electrode accommodating notches, and

both the positive electrodes and the negative electrodes are block-shaped, and rear ends thereof are clamped to the shell through the clamping grooves.

5. The building block sheet according to claim 1, characterized in that:

wherein a plurality of edge portions are provided to define a polygon,

the electrical connection assembly further comprises an isolation frame arranged between the positive electrode conductive frame and the negative electrode conductive frame

to isolate the positive electrode conductive frame from the negative electrode conductive frame, and

wherein the positive electrode conductive frame, the negative electrode conductive frame and the isolation frame are all matched with the polygon.

6. The building block sheet according to claim 5, characterized in that:

wherein one of the positive electrode conductive frame/the negative electrode conductive frame and the isolation frame is provided with a plurality of positioning holes, and the other one is provided with a plurality of positioning columns matched with the positioning holes,

the positive electrode conductive frame is provided with negative electrode avoidance notches corresponding to the negative electrodes for avoiding the negative electrodes, and

the negative electrode conductive frame is provided with positive electrode avoidance notches corresponding to the positive electrodes for avoiding the positive electrodes.

7. The building block sheet according to claim 5, characterized in that:

wherein the positive electrode conductive frame and the plurality of positive electrodes are integrally formed, at least part of an outer surface of the positive electrode conductive frame and at least part of an outer surface of each of the positive electrodes are made of a conductive material,

the negative electrode conductive frame and the plurality of negative electrodes are integrally formed, at least part of an outer surface of the negative electrode conductive frame and at least part of an outer surface of each of the negative electrodes are made of a conductive material, and

at least part of an outer surface of the isolation frame is made of an insulating material, or the isolation frame is made of an insulating material.

8. The building block sheet according to claim 1, characterized by further comprising:

a plurality of magnetic attraction members,

wherein each of the edge portions is provided with a pair of magnetic attraction members for attracting and binding with an edge portion of another building block sheet, and

the pair of magnetic attraction members are arranged on the corresponding edge portion in a polarity-complementary manner.

9. The building block sheet according to claim 1, characterized in that:

wherein the edge portion has a fitting structure for assembling and binding with an edge portion of another building block sheet with a corresponding fitting structure.

10. The building block sheet according to any one of claims 5 to 9, characterized in that:

wherein the building block sheet is a functional building block sheet, and

the functional assembly comprises:

a power supply rack, provided with one or more positive connection terminals and one or more negative connection terminals, the positive connection terminals and the negative

connection terminals are respectively configured to contact the positive electrode conductive frame and the negative electrode conductive frame to achieve electrical connection; and

one or more functional electrical devices, arranged on the power supply rack,

wherein the functional electrical devices comprise any one or a combination of two or more of a light-emitting device, a sound production device and an acousto-optic device.

11. The building block sheet according to claim 10, characterized in that:

wherein the positive electrode conductive frame is provided with one or more protrusions for positive electrode contact, and the protrusions are provided on a side face of the positive electrode conductive frame facing the isolation frame,

the negative electrode conductive frame is provided with one or more protrusions for negative electrode contact, and the protrusions are provided on a side face of the negative electrode conductive frame facing the isolation frame,

the isolation frame is provided with positive electrode fitting grooves matching the protrusions for positive electrode contact, and negative electrode fitting grooves matching the protrusions for negative electrode contact,

the positive connection terminals are arranged inside the positive electrode fitting grooves, and are in contact with the protrusions for positive electrode contact by fitting the protrusions for positive electrode contact into the positive electrode fitting grooves, and

the negative connection terminals are arranged inside the negative electrode fitting grooves, and are in contact with the protrusions for negative electrode contact by fitting the protrusions for negative electrode contact into the negative electrode fitting grooves.

12. The building block sheet according to claim 10, characterized in that:

wherein a plurality of functional electrical devices are provided, being light-emitting devices,

the power supply rack is in a strip shape, a cross shape, a star shape, a polygonal shape or a combination thereof, and

the plurality of light-emitting devices are arranged along a contour of the power supply rack.

13. The building block sheet according to any one of claims 1 to 9, characterized in that:

wherein the building block sheet is a power supply building block sheet, and

the functional assembly comprises an electrical storage device arranged at an inner side of the electrical connection assembly.

14. The building block sheet according to claim 13, characterized in that:

wherein the functional assembly further comprises a circuit board electrically connected to the electrical storage device,

the circuit board is at least provided with a switch button and a charging interface, and

the shell is provided with clearance holes matching the switch button and the charging interface, and the switch button and the charging interface are exposed from the clearance holes.

15. A building block toy, characterized by comprising:

a plurality of building block sheets according to any one of claims 1 to 14,

wherein some of the building block sheets serve as functional building block sheets;

some of the building block sheets serve as power supply building block sheets for supplying power to the functional building block sheets,and

when two of the functional building block sheets are assembled together, the positive electrodes and the negative electrodes of the corresponding functional building block sheets are correspondingly in contact with each other.