Dec. 6, 1932. C. E. SWANSON 1,890,269

TOY CONSTRUCTION UNIT

Filed April 10, 1930 2 Sheets-Sheet 1

Fig. 1.

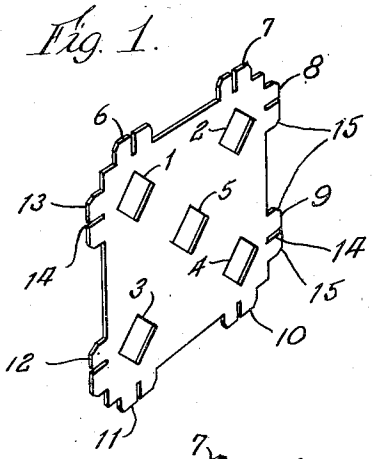


Fig. 2

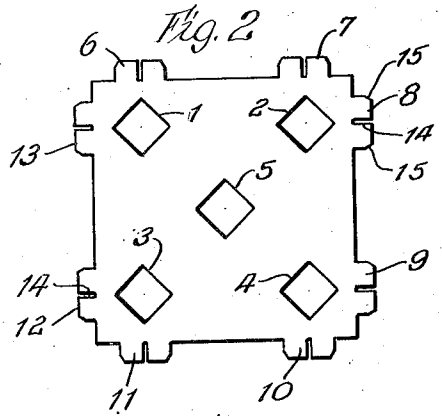


Fig. 3

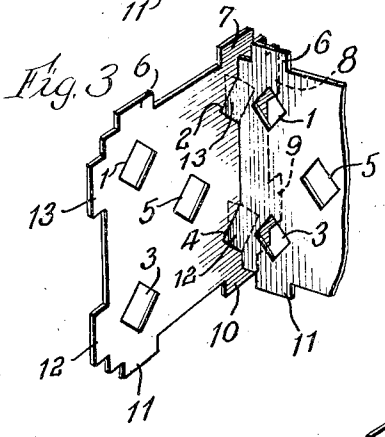


Fig. 4

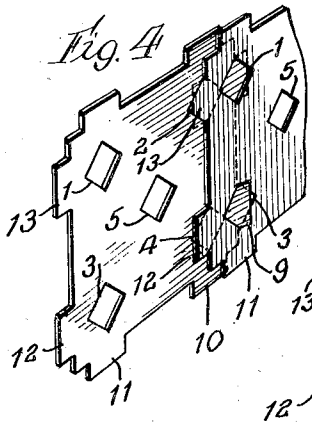


Fig. 5

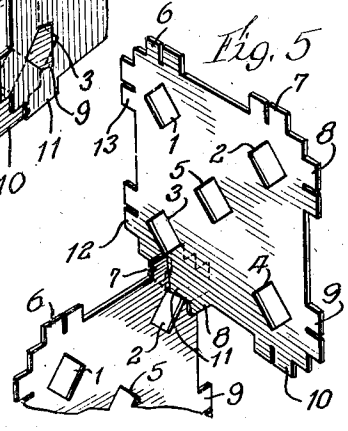
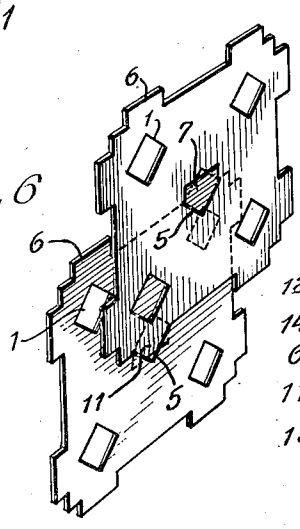


Fig. 6



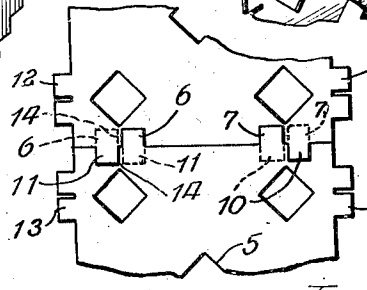


Fig. 7

Inventor:
Carl E. Swanson
By: Fisher, Clapp, Soans & Pond.
Attys.

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Fig. 8

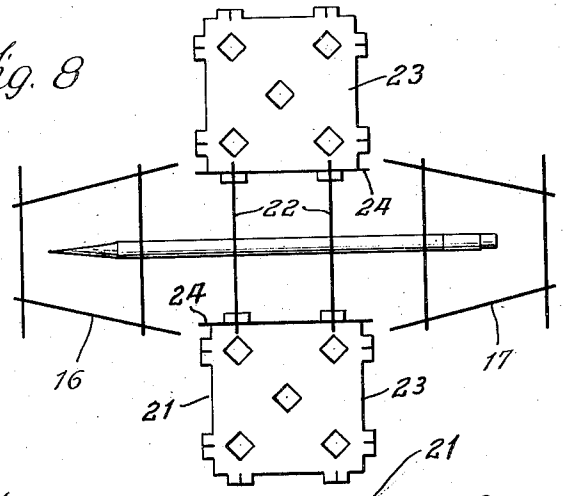


Fig. 9

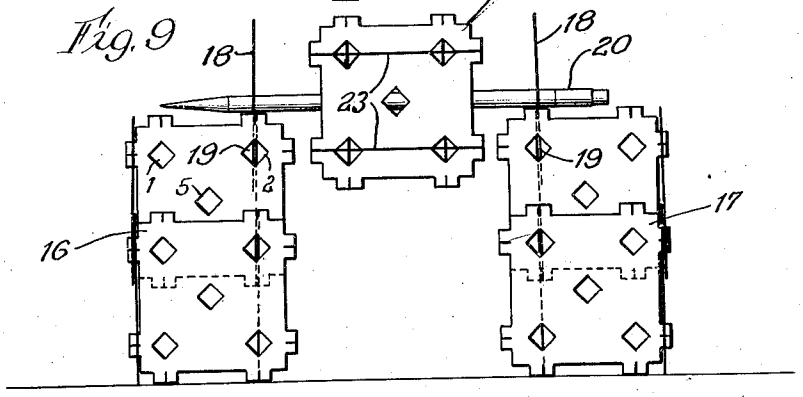


Fig. 10

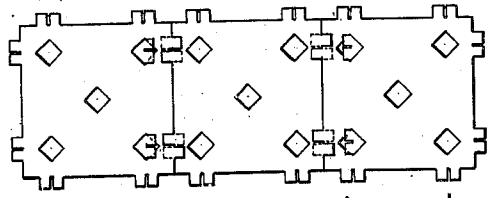


Fig. 11

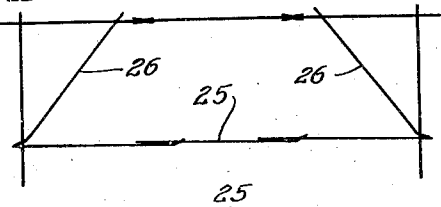
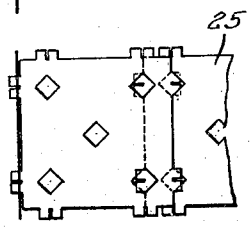


Fig. 12



Inventor:
Carl E. Swanson.
By: Fisher, Cluff, Soans & Paul
Attys.

Patented Dec. 6, 1932 1,890,269

UNITED STATES PATENT OFFICE

CARL E. SWANSON, OF CHICAGO, ILLINOIS

TOY CONSTRUCTION UNIT

Application filed April 10, 1930. Serial No. 443,038.

This invention relates to toys, and more particularly to toy construction units in the nature of flat cards or the like which are adapted to be connected to form representations of a practically infinite number of structures or articles.

The objects of the invention are to provide a toy of the character indicated which consists of a plurality of like, or substantially like, units, which are provided with means whereby the same may be connected or interlocked; to provide means whereby the units may be connected in a plurality of ways so that the units are capable of being associated in various manners; to provide a unit of the type referred to which may be easily manufactured, both cheaply and economically, and to provide a toy which is adapted for use by children of a comparatively wide range of ages.

Other objects and advantages of the invention will be understood by reference to the following specification and accompanying two sheets of drawings in which a preferred embodiment of the invention is illustrated, together with typical examples of structures formed by connecting a plurality of the units.

In the drawings:

Fig. 1 is a perspective and Fig. 2 is an elevation of a toy construction unit embodying a preferred form of the invention.

Figs. 3, 4, 5, 6 and 7 diagrammatically illustrate various manners in which two units may be connected.

Figs. 8 and 9 are diagrammatic plan and side views, respectively, of one structure made by connecting a plurality of units such as illustrated in Figs. 1 and 2.

Figs. 10 and 11 are diagrammatic plan and side views, respectively, of another structure formed with units of the present invention.

Fig. 12 is a diagrammatic fragmentary bottom plan of the structure shown in Fig. 11.

Referring now to the drawings, the toy construction unit according to the present invention consists of a flat member, preferably of sheet material, such as a suitable grade of cardboard, celluloid, metal or other material. The unit is preferably square in general outline and is provided with a plurality of openings therein, as indicated at 1, 2, 3, 4 and 5. The openings 1, 2, 3 and 4 are preferably located adjacent the respective corners of the unit and are approximately square and arranged with their diagonals extending parallel to the sides of the unit. The opening 5 is of the same size as the openings 1 to 4 inclusive, and is located substantially centrally of the unit. The opening 5 may also be said to be located at the intersection of lines joining the aligned sides of the openings 1 and 4 and 2 and 3. The openings 1, 2, 3 and 4 may be said to define the corners of a polygon within the area of a unit, for the reason that imaginary lines (extending substantially parallel to the sides of the unit in this instance) joining the respective openings will form an enclosure (a square in this instance) within the area of the unit. In the claims, the word "polygon" is used in a broad sense to describe any imaginary enclosure formed with three or more imaginary straight lines.

The unit is provided with a plurality of ears adapted to fit in the openings 1 to 5 inclusive, each ear being of a width approximately equal to the diagonal of the openings. Preferably, each side of the unit is provided with two ears, as indicated. The ears are designated 6, 7, 8, 9, 10, 11, 12 and 13. As clearly shown in Fig. 2, the ears are arranged in alignment with the openings and each ear is preferably slitted or slotted as indicated at 14. The corners of the ears are also preferably cut off, as indicated at 15, so as to form reduced ends on the ears for a purpose which will presently appear.

Toy units, such as shown in Figs. 1 and 2 and described above, may be connected by inserting a pair of ears on one side of one unit into a pair of openings of another unit, substantially as indicated in Fig. 3. In this instance, the ears 12 and 13 of one unit are shown as fitting through the openings 2 and 4 of another unit. It will be evident from an inspection of Fig. 3 that the width of the ears should be such that they fit snugly across the diagonals of the openings.

Obviously the projections must fit in and between the opposite notches or seats afforded by the diagonally opposite corners of the

openings with such snugness as to effectually connect together the units, and to require the application of considerable force in order to dislodge the projections from the openings and effect separation of the units. The material width of the intermediate portions of the openings transverse to the projections permits slight bending or flexing of the projections should this become necessary because of any excess width of the projections beyond the actual distance between diagonally opposite corners of the openings, thereby maintaining the necessary snug fit of the projections without tearing or otherwise damaging the material of the unit having the openings. In other words, this provision for permitting bending or flexing of the projections, whenever necessary, affords compensation for any excess strain or pressure brought upon the walls or the edges of the openings by reason of any excess in the widths of any of the projections.

The arrangement shown in Fig. 3 is such that one unit is disposed at substantially right angles to the other unit. However, it will be obvious that the angle may be varied, inasmuch as the connection between the two units is not, strictly speaking, a rigid connection. It may be also noted that where the units are made of flexible material, for instance, cardboard, the units may be flexed sufficiently to permit variation of the perpendicular arrangement.

Fig. 4 illustrates one manner in which two units may be connected so that one constitutes, in effect, an extension of the other. The two units are substantially co-planer in this instance. In this instance, the tongue 13 of one unit is shown as projecting rearwardly through the opening 2 of another, while the tongue 9 of the last-mentioned unit projects forwardly through the opening 3 of the first-mentioned unit. It will be seen that the resiliency of the tongues 13 and 9 acting in opposite directions serves to effectively lock the two units together as described.

In Fig. 5, a form of connection is shown wherein the slots 14 are made use of. In this instance, the tongues 7 and 11 of the respective units are crossed so that each unit fits into the slot of the other. It will be noted that if desired, the tongues 6 and 7 of the lower unit in Fig. 5 may first be projected upwardly through the openings of another unit substantially in the manner illustrated in Fig. 3, while the tongues 10 and 11 of the upper unit may be projected downwardly through another pair of openings of the intermediate unit. In that case, the tongues 7 and 11 will project in opposite directions through one opening of an intermediate unit.

In Fig. 6, two units are shown connected by inserting the tongue 7 of one unit through the opening 5 of another, while the tongue 11 of the last-mentioned unit is projected through the opening 5 of the first-mentioned unit. This method of connecting the unit is similar to that illustrated in Fig. 4 but results in a different relative arrangement of the two units.

In Fig. 7, another form of connection is illustrated, wherein the slots 14 in the tongues are also made use of. As shown, one portion of the tongue 11 of the upper unit extends over the corresponding portion of the tongue 6 of the lower unit, while the remaining portions of the tongues 6 and 11 are arranged in the reverse relation. The tongues 7 and 10 are arranged in a similar manner. In this form of connection, the edges of the respective units abut one another so that there is no material overlapping of the units. The only overlapped portions are occasioned by the overlapping tongue portions.

In Fig. 8, I have illustrated a form of wind mill or wind turbine which may be constructed by connecting a plurality of units such as above described, an ordinary pencil being used for a shaft about which the rotary element turns. In this structure, a pair of pedestals 16 and 17 are formed substantially as illustrated, and these pedestals are preferably provided with an upstanding part 18. The upstanding part 18 of each pedestal is of course formed with a unit which is supported by having a pair of its oppositely disposed ears projected through oppositely disposed openings, as indicated at 19, 19 in the opposite side portions of the pedestals. A pencil, indicated at 20, positioned in the central openings 5 of the upstanding units 18, serves as a shaft about which the rotor 21 may be rotated. The rotor 21 includes a pair of center units 22, 22 and end units 23, 23 which are connected in the manner illustrated in Fig. 5. In this instance, I have also indicated an intermediate unit 24, 24 interposed between the respective units 22 and 23. The intermediate unit 24 serves to impart rigidity to the structure.

Figs. 10, 11 and 12 illustrate a bench or table structure, which, in the present instance, is formed by connecting three units to form the top, these units being connected in the manner illustrated in Fig. 7. Supporting legs depend from the top adjacent its opposite ends, the supporting legs being formed by units connected to the top in the manner illustrated in Fig. 3. A shelf or brace arrangement indicated at 25 is formed of three units connected in the manner illustrated in Fig. 4, the ends of the shelf structure being connected to the legs in the manner illustrated in Fig. 3. Corner braces, indicated at 26—26, may be provided, these braces being formed of units extending diagonally between the legs and the top, these brace units having ears projecting through certain of the openings in the top and legs, substantially as indicated.

It will be obvious that the number of structures which can be made with a plurality of units such as above described is practically unlimited and depends largely upon the ingenuity of the child playing with the toy. The structures herein illustrated are selected merely for the reason that they show the use of many of the methods of connecting the units. From an inspection of Figs. 8 and 9, it will be readily understood that two or more ears of a corresponding number of units may be passed through the same opening. For instance, in Fig. 9, two ears are shown passing through the opening 2 of the upper unit in the pedestal 16. This is possible because the ears are permitted to buckle or bulge slightly, if necessary, to fit in the openings, and also by reason of the compressibility or distortability of the interfitting parts when the units are made of paper or other material capable of being compressed or distorted. The cut-off corners 15 of the ears facilitate introduction of the ears into the openings. The openings need not, of course, be square as herein disclosed. Simple round or otherwise shaped openings may be used. However, I prefer to provide openings so shaped as to form niches for snugly receiving edge portions of the respective ears, whereby rigidity of the connections between two or more units is increased. In this instance, the corners of the square openings constitute such niches.

I am aware that modifications may be made in the above described toy construction unit arrangement without departing from the spirit of my invention, the scope of which should be determined by reference to the following claims, the same being construed as broadly as possible consistent with the state of the art.

I claim as my invention:

1. A toy construction unit comprising a rectangular member of sheet material which is flexible but of self-sustaining stiffness, said member being provided with a plurality of openings respectively located adjacent the corners of the unit, and a plurality of ears projecting from an edge of the member, adapted to be inserted into the openings of a similar unit for connecting the two units, said openings being shaped to provide oppositely disposed niches for snugly receiving the opposite edges of the respective ears received by said openings the width of each ear being substantially equal to the distance between the oppositely disposed niches to effect the snug fit of the ears in the openings.

2. A toy construction unit of the class described comprising a substantially square member of sheet material which is flexible but of self-sustaining stiffness, said member being provided with substantially square openings located adjacent the corners of the member, said openings being arranged with their diagonals substantially parallel to the edges of the unit, and a pair of ears projecting from an edge of said unit, said ears being formed integral with the unit and being located in alignment with the openings adjacent said edge, said ears being of a width approximating the diagonal dimension of said openings.

3. A toy construction unit of the class described comprising a sheet material member formed of material which is flexible but of self-sustaining stiffness, said member being substantially square and being provided with substantially square openings located adjacent the corners of the member, said openings being arranged with their diagonals substantially parallel to the edges of the unit, and a pair of ears projecting from each of a pair of oppositely disposed edges of the unit, said ears being formed integral with the unit and located in alignment with the openings adjacent said edge, and said ears being of a width approximating the diagonal dimension of said openings.

4. A toy construction unit of the class described comprising a substantially rectangular member formed of sheet material which is flexible but of self-sustaining stiffness, said member being provided with a pair of ears projecting from each of a pair of oppositely disposed edges thereof and having a pair of openings located adjacent each of a pair of oppositely disposed edges of the unit, said openings being provided with niches for snugly receiving edge portions of the respective ears, and said niches being located so as to receive said edge portions when the ears are disposed substantially parallel to the edges of the unit, said ears being formed integral with the unit and located in alignment with the openings adjacent the respective edges of the unit from which said ears project.

5. A toy construction unit of the class described comprising a substantially rectangular member formed of sheet material which is flexible but of self-sustaining stiffness, said member being provided with a pair of ears projecting from each of a pair of oppositely disposed edges of said unit, and having openings located adjacent the corners of the member, said openings being provided with niches for snugly receiving edge portions of the respective ears, and said niches being located so as to receive said edge portions when the ears are disposed substantially parallel to the edges of the unit, said ears being formed integral with the unit, located in alignment with the openings adjacent the respective edges of the unit from which said ears project, and being slotted intermediate their widths so as to be capable of receiving the thickness of a second, similar unit.

6. A toy construction unit of the class described comprising a sheet material member formed of material which is flexible but of self-sustaining stiffness, said member being

substantially square and being provided with substantially square openings located adjacent the corners of the member, said openings being arranged with their diagonals substantially parallel to the edges of the unit, and a pair of ears integral with and projecting from each of a pair of oppositely disposed edges of the unit, said ears being located in alignment with the openings adjacent the edge from which the respective ears project, of a width approximating the diagonal dimension of said openings, and being slotted intermediate their width so as to be capable of receiving the thickness of a second similar unit.

7. A toy construction unit of the class described comprising a substantially rectangular member formed of sheet material which is flexible but of self-sustaining stiffness, said member being provided with a pair of ears projecting from each of the edges of said unit, and having openings located adjacent the corners of the member, said openings being provided with niches for snugly receiving edge portions of the respective ears, and said niches being located so as to receive said edge portions when the ears are disposed substantially parallel to the edges of the unit, said ears being formed integral with the unit and located in alignment with the openings adjacent the respective edges of the unit from which said ears project.

8. A toy construction unit of the class described comprising a substantially rectangular member formed of sheet material which is flexible but of self-sustaining stiffness, said member being provided with a pair of ears projecting from each of a pair of oppositely disposed edges of said unit, and having openings located adjacent the corners of the member, said openings being provided with niches for snugly receiving edge portions of the respective ears, and said niches being located so as to receive said edge portions when the ears are disposed substantially parallel to the edges of the unit, said ears being formed integral with the unit and located in alignment with the openings adjacent the respective edges of the unit from which said ears project, said member being also provided with another ear-receiving opening located substantially centrally of said corner openings.

9. A toy construction unit of the class described comprising a sheet material member formed of material which is flexible but of self-sustaining stiffness, said member being substantially square and being provided with square openings located adjacent the corners of the member, said openings being arranged with their diagonals substantially parallel to the edges of the unit, and a pair of ears projecting from each of a pair of oppositely disposed edges of the unit, said ears being formed integral with the unit and located in alignment with the openings adjacent said edge, and said ears being of a width approximating the diagonal dimension of said openings, said member being also provided with another opening of similar size and arrangement, located substantially centrally of said corner openings.

10. A toy construction unit of the class described comprising a quadrilateral member formed of sheet material which is flexible but of self-sustaining stiffness, said member being provided with a pair of ears projecting from each of a pair of oppositely disposed edges of said unit, and having openings located adjacent the corners of the member, said openings being provided with niches for snugly receiving edge portions of the respective ears, and said niches being located so as to receive said edge portions when the ears are disposed substantially parallel to the edges of the unit, said ears being formed integral with the unit and located in alignment with the openings adjacent the respective edges of the unit from which said ears project.

11. A toy construction unit comprising a flat member of sheet material provided with a plurality of relatively spaced apertures therein and a plurality of relatively spaced ears projecting edgewise from the unit substantially in continuation of the plane thereof and substantially in alignment with said apertures, said apertures being adapted to receive the ears of a second similar unit to connect the two units and said apertures having niches for receiving the edges of said ears.

12. In a toy construction set comprising units of resilient sheet material, a unit having an edge projection extending beyond the periphery of the unit, and another unit having an opening located inwardly from its periphery to receive the edge projection of the first-named unit to connect said units, the width of the projection being substantially equal to the major dimension of the opening to snugly fit therein, said opening being materially wider than the thickness of the said projection, and the wall of said opening having a seat of a size and shape to receive an edge portion of the projection and located at one end of the major dimension of the opening, the walls of the seat being disposed to engage opposite faces of the projection and hold the same against displacement.

13. In a toy construction set comprising units of resilient sheet material, a unit having an edge projection extending beyond the periphery of the unit, and another unit having an opening located inwardly from its periphery to receive the edge projection of the first-named unit to connect said units, the width of the projection being substantially equal to the major dimension of the opening to snugly fit therein, said opening being materially wider than the thickness of the said projection and the wall of said opening hav-

ing seats at opposite ends of the major dimension of the opening and of a size and shape to respectively receive opposite edge portions of the projection, the walls of each seat being disposed to engage opposite faces of the projection and hold the same against displacement.

14. In a toy construction set comprising units of resilient sheet material, a unit having an edge projection extending beyond the periphery of the unit and another unit having an opening located inwardly from its periphery to receive the edge projection of the first-named unit to connect said units, said opening being materially wider than the thickness of the said projection and the wall of said opening having two pairs of seats, one pair being aligned at an angle to the alignment of the other pair, each seat being of a size and shape to receive an edge portion of the projection, the walls of each seat being disposed to engage opposite faces of the projection and hold the same against displacement, and the width of the projection being substantially equal to the distance between each pair of seats to fit snugly in either pair of seats.

15. The combination of a pair of toy construction units of resilient sheet material, one unit having an edge projection extending beyond the periphery of the unit, the other unit having an opening located inwardly from its periphery and receiving the edge projection of the first-named unit to connect said units, the wall of said opening having opposite seats spaced apart at substantially the width of the projection and respectively receiving opposite edge portions of the projection, the opening being materially wider than the thickness of the projection to permit bending or flexing of the projection in the opening, and the walls of the respective seats snugly engaging opposite faces of the projection and holding the same against displacement.

16. A toy construction set comprising units of resilient sheet material, one of the units having a pair of openings for each edge of the unit spaced apart in the direction of said edge a predetermined distance, the spacing of the openings of each pair of openings being the same, and another unit having pairs of edge projections extending beyond the periphery of the unit and spaced at the predetermined distance between the openings, each projection being of the size to fit snugly in one of the openings.

CARL E. SWANSON.