Oct. 20, 1936. M. A. A. FAY 2,057,942

TOY CONSTRUCTION UNIT

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Fig. 1

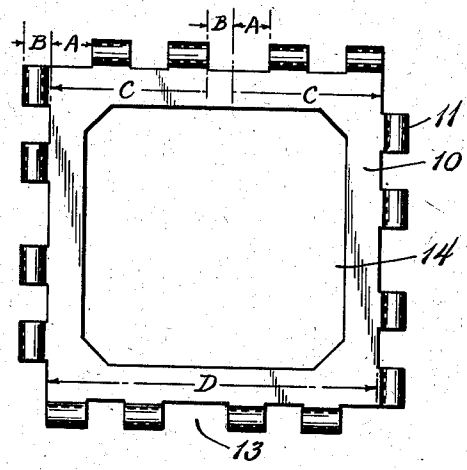


Fig. 2

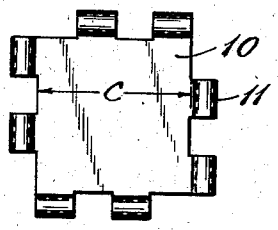


Fig. 5

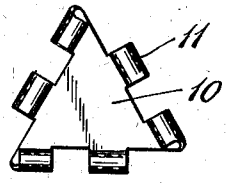


Fig. 3

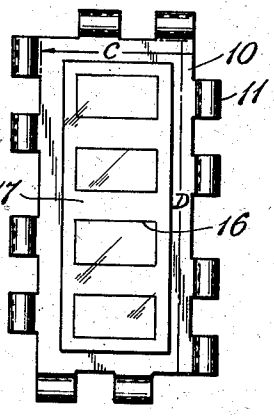


Fig. 4

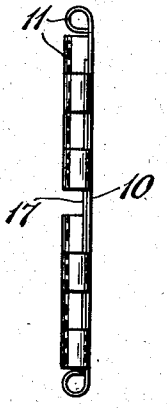


Fig. 6

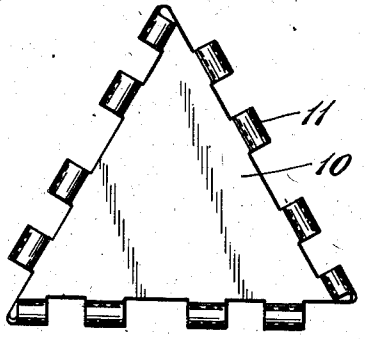


Fig. 7

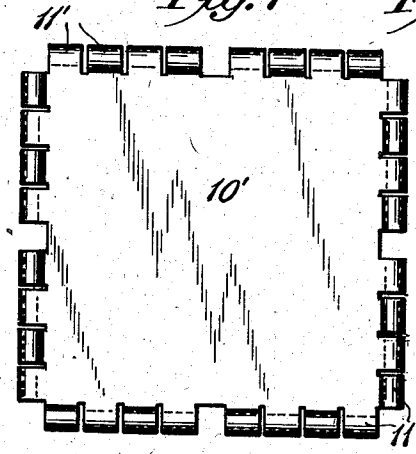


Fig. 8

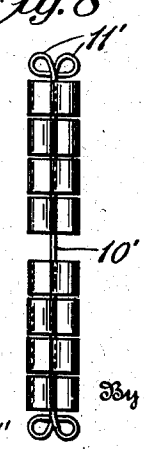
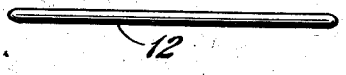


Fig. 9



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Fig. 10

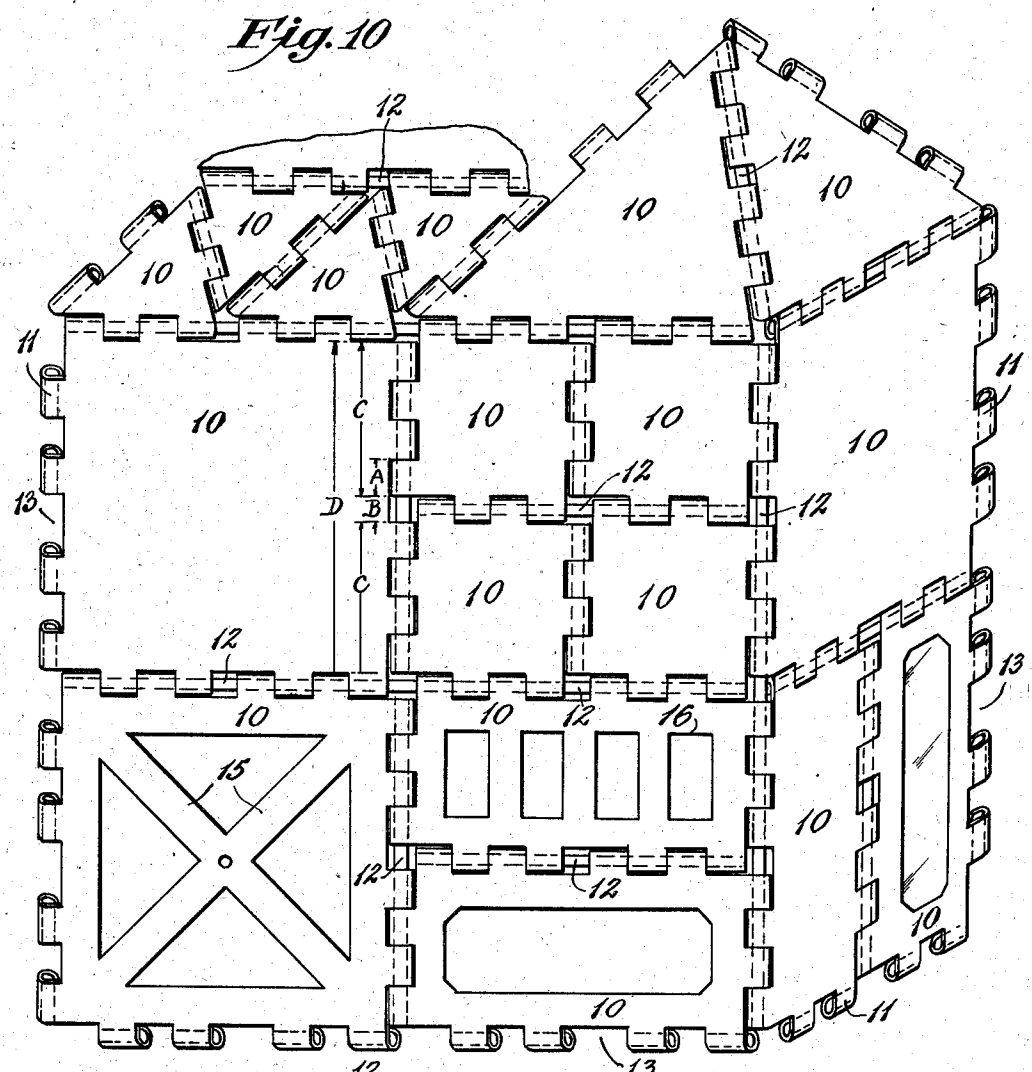
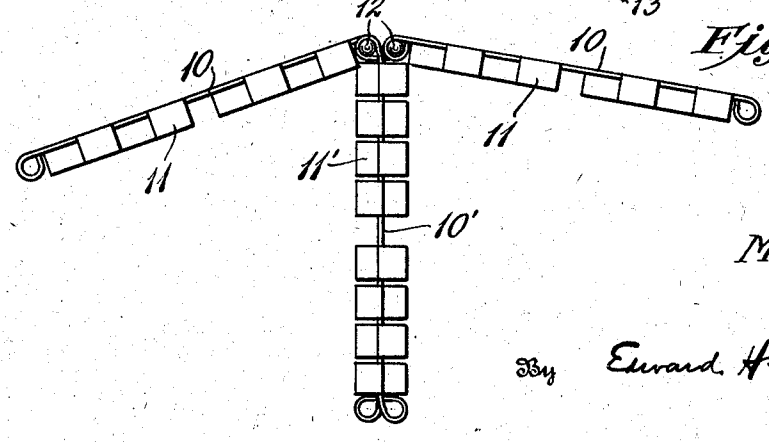


Fig. 11



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2,057,942

TOY CONSTRUCTION UNIT

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Application January 29, 1935, Serial No. 3,967

8 Claims. (Cl. 46—31)

This invention relates to toys of the type employing a plurality of construction units, each provided with straight edges having projecting hinge ears or loops, being adapted to be positioned edge to edge with the hinge ears on one edge positioned between those of another and in aligned relation so as to receive a pin whereby the units are connected together. This application is a continuation, in part, of my application Serial No. 619,605 filed June 27, 1932, entitled Scientific and recreative game composed of plates having geometrical forms.

The aim of the invention is to provide a toy of the type wherein the units are so constructed, arranged and dimensioned that the sides of plates of like dimensions may be indiscriminately or universally and interchangeably matched with one another, and the sides of a plurality of plates of smaller dimensions may be matched with respect to sides of the plates of larger dimension. The idea is to enable the units to be interchangeably and universally assembled edge to edge with the greatest facility and with the assurance that they will properly match in the desired relation. By providing an arrangement wherein the sides of smaller dimension of a plurality of units may be matched with a single side of larger dimension of another unit, a great variety of designs and figures may be very easily and quickly made and relatively stronger and more rigid constructions are obtained.

Other aims and advantages of the invention will appear in the specification, when considered in connection with the accompanying drawings, wherein:

Fig 1 is a face view of a toy unit or plate embodying the invention;

Fig. 2 is a face view of a smaller unit which may be matched in multiples of two with any side of the unit or plate shown in Fig. 1;

Fig. 3 is a face view of a rectangular unit corresponding in width to the dimension of the sides of the unit shown in Fig. 2 and corresponding in length to the dimension of the sides of the unit shown in Fig. 1;

Fig. 4 is an edge view of one of the units showing the manner in which the hinge knuckles or ears are offset from the plane of said unit;

Fig. 5 is a face view of a unit in the form of an isosceles triangle, the sides of which correspond in dimension and arrangement to the sides of the plate shown in Fig. 2;

Fig. 6 is a face view of a larger triangular unit, the dimension and arrangement of the sides of which correspond to the unit shown in Fig. 1;

Fig.7 is a face view of a unit having two sets of hinge knuckles or ears on each edge adapted to be used for a partition;

Fig. 8 is an edge view of Fig. 7;

Fig. 9 shows a hinge pin adapted to be used in assembling the units;

Fig. 10 is a perspective view of a number of plates assembled together to form a house or shed, for example; and

Fig. 11 illustrates one mode of assembling plain units and a partition unit.

Referring more particularly to the drawings, the toy comprises a plurality of units which, in this instance, are in the form of flat plates of polygonal shape with straight edges, the edges of each plate preferably being either of like dimensions or having a dimension in one direction which is a modified multiple, as hereinafter described, of the dimension in the other direction, and the dimensions of each plate being so proportioned with respect to the dimensions of the other plates that the several plates may be matched edge to edge with their knuckles in intervening or matched relation. The body portions of the several plates are designated by the numeral 10, and the knuckles by the numeral 11. These plates may be formed of any suitable material but are preferably formed of sheet metal by stamping out a blank of the desired form with projecting ears and then curling the ears into the form of cylinders. The ears are preferably offset out of the plane of the plate, as shown most clearly in Fig. 4. While I have shown the plates in the accompanying drawings as having square, rectangular, or triangular shapes, other polygonal figures may be used. The plates are adapted to be held in assembled relation by pins 12.

The knuckles 11 about the edges of each plate are of like length and are similarly arranged. The corner of each plate is of like configuration. More particularly, at each corner of the body portion of the plate, there is at one side edge thereof a knuckle, the outer end of which is flush with the adjacent edges of the plate and the said adjacent edge of the plate has a knuckle spaced from the first edge a distance equal to or only slightly greater than the length of a knuckle, this space being indicated by the letter A (Fig. 1). The knuckles at one edge of a plate are staggered or offset with respect to those at the opposite edge. The extent to which the knuckles extend beyond the body portions of the plates is designated by the letter B.

The plate shown in Fig. 2 has at each side edge two knuckles with the space therebetween equal

to the length of a knuckle. The plate shown in Fig. 1 has four knuckles along each edge, the two knuckles on each side of the medial line of the plate having a space therebetween equal to the length of a knuckle, and the center space 13 being equal to the length of a knuckle plus the diameter of a knuckle, that is, equal to A plus B. In Fig. 3 is shown a rectangular plate with the knuckles at each end thereof arranged similarly to the knuckles of the plate shown in Fig. 2, and with the knuckles along the longer sides arranged similarly to the knuckles of the plate shown in Fig. 1. The knuckles on the small triangle shown in Fig. 3 are arranged similarly to those of the plate shown in Fig. 2, and the knuckles of the larger triangle shown in Fig. 6 are arranged similarly to those of the plate shown in Fig. 1. Figs. 7 and 8 show a square plate like Fig. 1 having two sets of offset ears on each edge so that it may be used interchangeably with other plates to make a partition.

Each side dimension of the body portion of each plate is either equal to or a modified multiple or a modified de-multiple of each edge of all of the other plates so that sides of like dimension may be universally matched in the relation of one to one and sides of smaller dimensions may be matched in multiples to the sides of larger dimensions. Assuming, for the purpose of illustration, that C designates the length of a side of smaller dimension and D designates the side of larger dimension, D bears the following relation to C: $D=NC+(N-1)B$, B representing, as stated, the distance to which the knuckles extend beyond the body portion of the plates and N representing the number of C dimensions which may be matched with D. Applying the equation to the combination of the plates shown in Figs. 1 and 2, it will be seen that the dimension D is twice the dimension C plus the diameter of a knuckle. This equation also applies to plates of which one has a side edge or edges many times a multiple of the edge or edges of another plate. It is clear that the space 13 between the center knuckles is enlarged so as to receive a knuckle and also to accommodate the joint formed by the intermeshing knuckles between the smaller attached plates. The width of the rectangular plate shown in Fig. 3 bears the same relation to the length of that plate as does the side of the plate shown in Fig. 2 to the side of the plate shown in Fig. 1 so that two of these rectangular plates along their shorter dimensions may be matched against the side of a like plate along its greater dimension, or may be matched with any side of the plate shown in Fig. 1. It will be observed that in all cases, the longer spaces 13 between the knuckles are positioned so that, when a multiple of smaller plates are matched to a side of a plate of larger dimension, the joint between the smaller plates match with one end of this space, the other end of this space being filled by a knuckle on a smaller plate.

With the arrangement described, the several sets of plates may be interchangeable and universally matched with one another in any desired combinations and without reference to which side of a given dimension is applied to the side of another plate. Square plates of like dimension may have any side of one plate matched with any side of another plate. Any two sides of plates, such as shown in Figs. 2 and 5, may be matched with any side of the plates shown in Fig. 1, and any two plates, such as shown in Figs. 2 and 5, may be interchangeably and universally matched with either of the longer sides of the plate shown in Fig. 3.

In Figs. 7 and 8 the two sets of offset knuckles 11' on each edge of the plate 10' are exactly like the knuckles on the unit in Fig. 1. The knuckles on each edge are staggered in offset relation and may be made by making a series of saw cuts or slits and bending the ears as shown. The arrangement is the same as if two plain plates were secured together, face to face. Hence, these units serve as rigid partition elements to which the other units may be connected. One such arrangement is shown in Fig. 11. Of course, they will be made in a variety of polygonal shapes to match the other shapes, and they may be stacked with their knuckles intermeshed.

Referring again to the unit in Fig. 1, the plate is there shown as having a large opening 14 to reduce its weight and to add to its ornamental appearance. However, some of these units will be plain and some will be cut out to produce diagonal ribs or strengthening elements 15, both as shown in Fig. 10.

In Fig. 3, the plate is in the form of a window panel having openings 16, shown as being covered by a decorative transparent, or translucent sheet 17 suitably secured, as by adhesive, to the back face of the unit. It is contemplated that any of the open work units may be covered with suitable ornamental material.

Obviously, the present invention is not restricted to the particular embodiments thereof herein shown and described.

What is claimed is:

1. A toy construction unit, comprising a substantially flat member of polygonal shape having side edges presenting hinge ears protruding therefrom, all of said hinge ears being of the same dimensions, the length of at least one side edge being a multiple of the length of the edges of other units adapted to be secured thereto and said side edge having a wide gap near the middle to accommodate a hinge ear and the joint between adjacent units whose edges are of the smaller dimension.

2. A toy construction unit comprising a plate having straight edges and a plurality of spaced and similar hinge ears protruding from each edge, one of the edges of said plate being of a length which is a multiple of the length of the edges of other plates adapted to be secured thereto and having a relatively wide gap between hinge ears where the plates of smaller dimension are to be joined thereto to accommodate a hinge ear and the joint between the hinge ears of the plates of smaller dimension.

3. Constructional toy units comprising different sized plates having knuckles on their edges adapted to be secured together by means of pins, said knuckles being similarly disposed in relation to the corners of said plates and so distributed along the sides of said plates as to provide, in a side adapted to receive a plurality of plates for attachment thereto, a relatively wide space between certain of said knuckles to accommodate a knuckle and the joint between normally disposed intermeshed knuckles of a pair of abutting attached plates.

4. Constructional toy units comprising a plurality of polygonal straight edged plates of various shapes and dimensions and each having similarly sized knuckles extending from its side edges, the knuckles at one side being in staggered relation to those on the opposite side, all corners of said plates being of like construction, the side

edges of like dimensions of said plates being identical so as to be universally and interchangeably matched; each edge of longer dimension being twice the length of an edge of the next smaller length plus the extent to which a knuckle extends outwardly beyond the body portion of a plate, said knuckles along the edge of longer dimension having a relatively wide gap to accommodate a knuckle and the joint between intermeshed knuckles on the abutting edges disposed at right angles to said edge of longer dimension.

5. Constructional toy units comprising a plurality of polygonal straight edged plates of various dimensions and each having similarly sized knuckles extending from its side edges, and pins engageable in said knuckles for securing the plates together, each plate having the knuckles at one side in staggered relation to those at the opposite side, said knuckles along each side edge of a plate being arranged so that one end knuckle is at the end of said edge and the other end knuckle is spaced from the opposite end of said edge a distance equal to the length of a knuckle; edges of like dimensions being identical, the several edges of the several plates bearing the relation of $D=N\,C+(N-1)\,B$, where D is the length of the edge of one dimension, C is the length of edge of smaller dimension, N is the number of edges of smaller dimensions which can be matched with an edge of D dimension, and B is the diameter of a knuckle; the knuckles along the edge of larger dimension being spaced apart to accommodate the joints between the adjacent edges of the attached plates.

6. A constructional toy unit, comprising a flat, polygonal, straight edged plate having similarly sized, spaced knuckles extending from its side edges, all corners of said plate being identical, the edges of said plate being of different dimensions, an edge of larger dimension being twice the length of an edge of smaller dimension plus the outside diameter of a knuckle, the knuckles along an edge of larger dimension being arranged to provide an enlarged space where the multiples join each other, said enlarged space being sufficiently wide to accommodate a knuckle and a knuckle joint normal to said edge of larger dimension.

7. A toy construction unit comprising a plate of polygonal shape having straight edges; an equal number of spaced hinge ears protruding from all of its straight edges with the axis of rotation offset from and parallel with the plane of the plate on one side; and some of the edges having other sets of spaced hinge ears protruding from and parallel with the plane of the plate on the opposite side, whereby said unit may be employed as a partition wall at the junction of other units having hinge ears protruding from one side only.

8. A toy construction unit comprising a plate of polygonal shape having straight edges; spaced hinge ears protruding from all of its straight edges with their axes offset from and parallel with the plane of the plate on one side of said plate; and some of the edges having other sets of spaced hinge ears protruding from and parallel with the plane of the plate on the opposite side thereof, whereby said unit may be employed as a partition wall at the junction of other units having hinge ears protruding from one side only.

MARC AURELE ALFRED FAY.