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APRIL 27, 1943.

C. MARKES ET AL  
TOY BUILDING SET OF METAL

Serial No.  
319,792

BY A. P. C.

Filed Feb. 19, 1940

5 Sheets-Sheet 1

Fig. 1

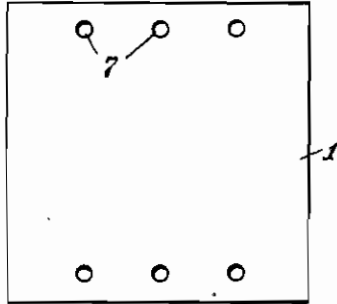


Fig. 2

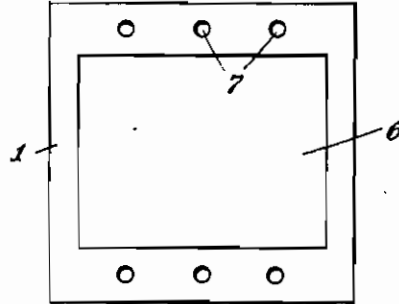


Fig. 3

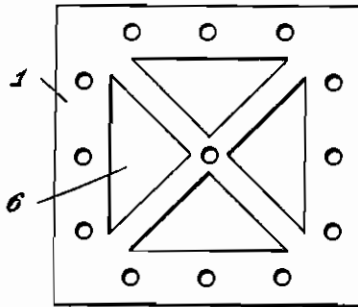


Fig. 4

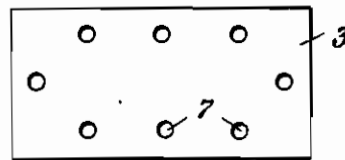


Fig. 6

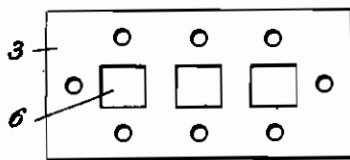


Fig. 5

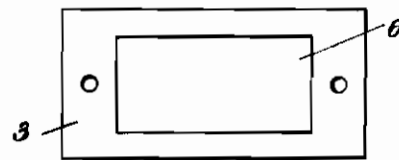


Fig. 7

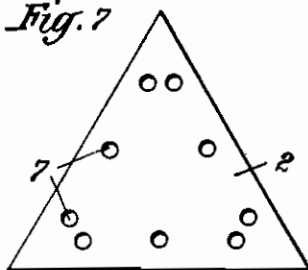


Fig. 8

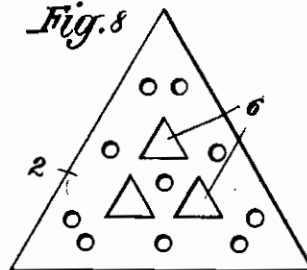
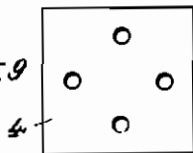


Fig. 9

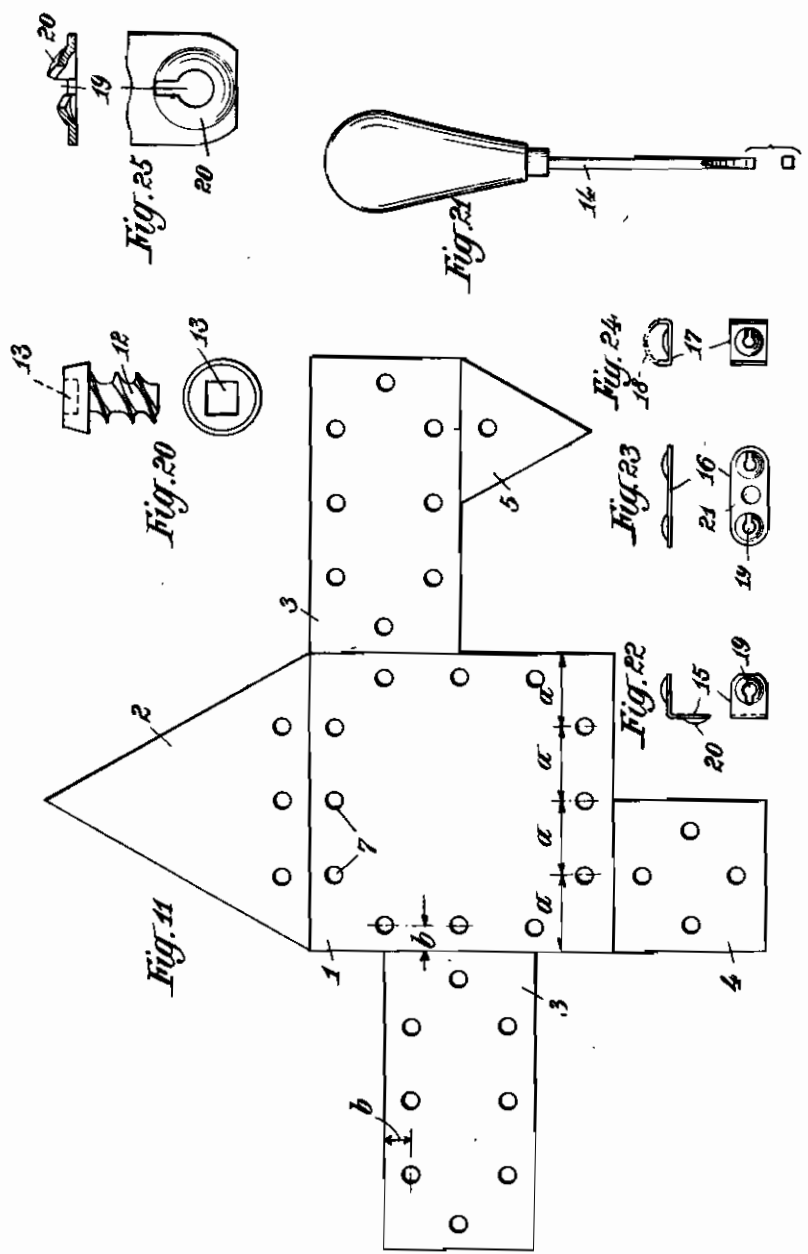


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5 Sheets—Sheet 3

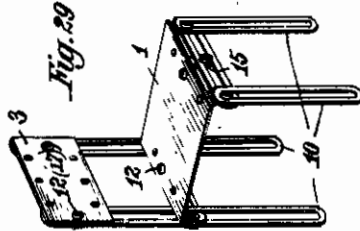
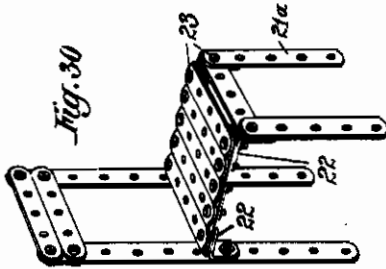


Fig. 12

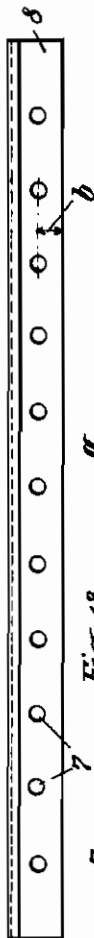


Fig. 13

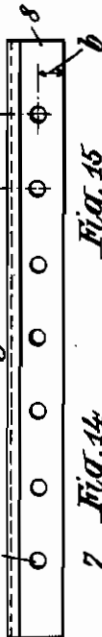


Fig. 15



Fig. 14



Fig. 16



Fig. 17

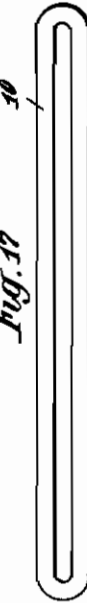


Fig. 28

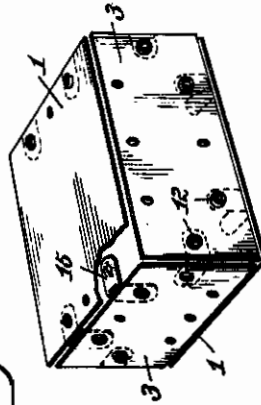


Fig. 19

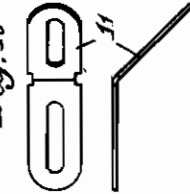
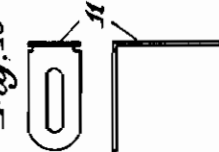


Fig. 18

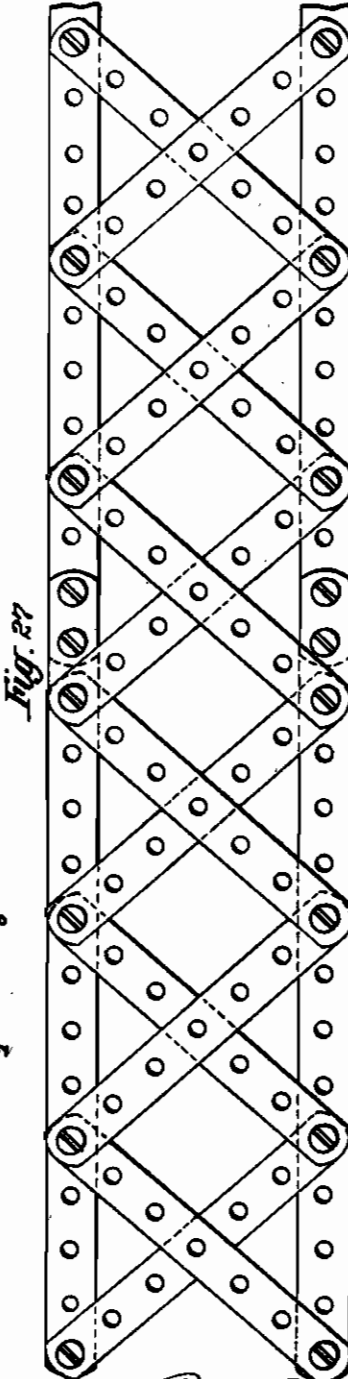
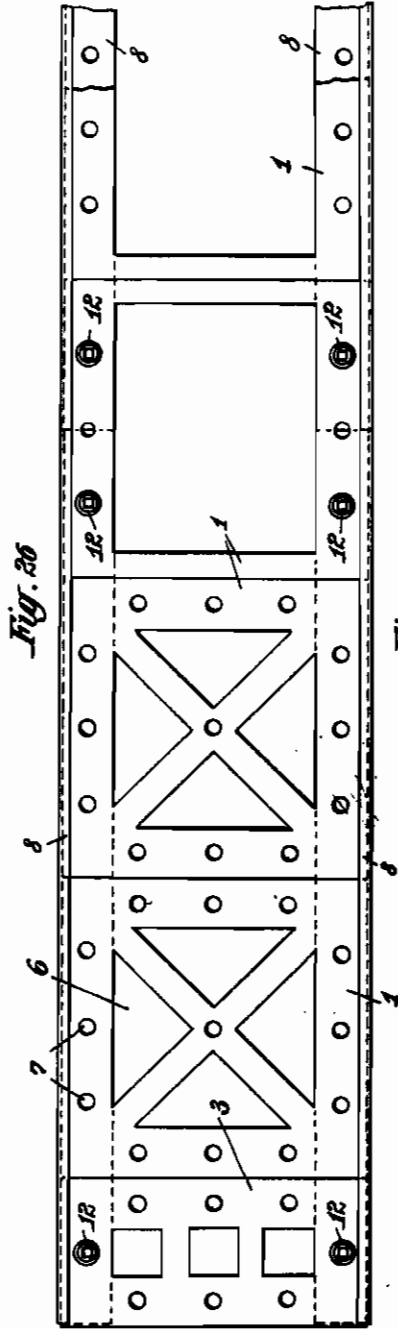


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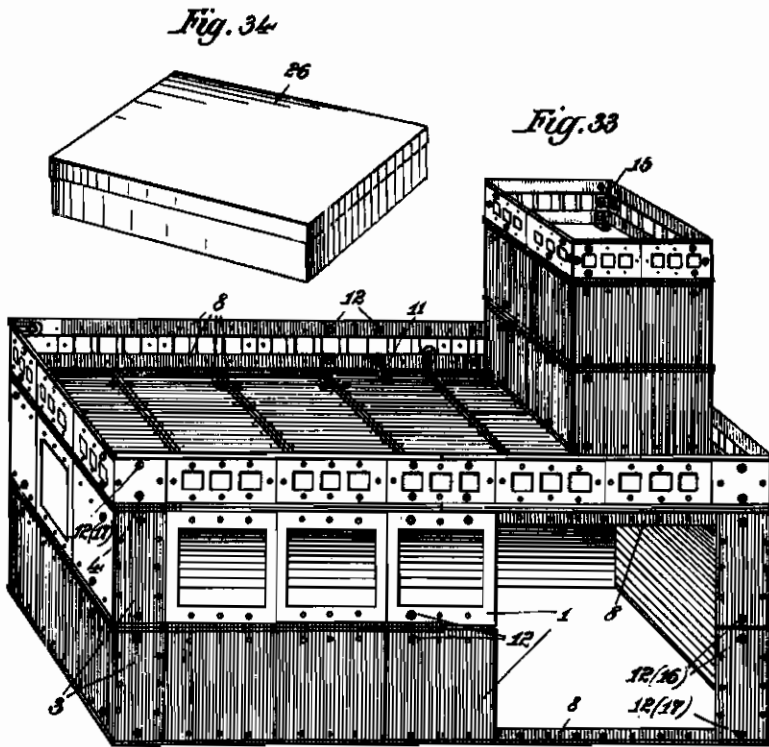
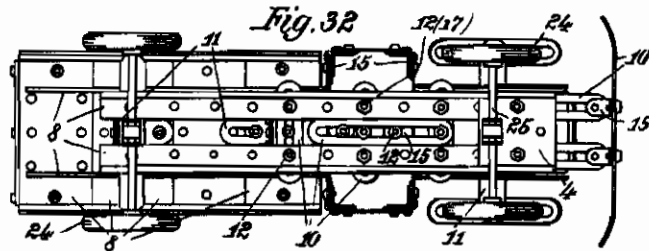
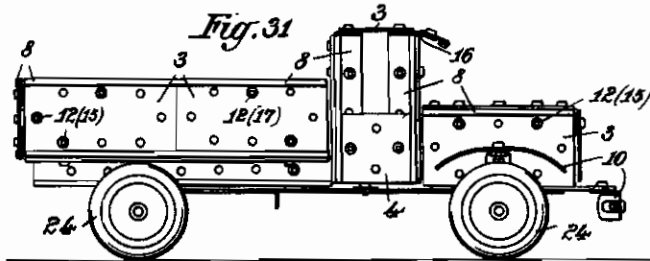


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# ALIEN PROPERTY CUSTODIAN

## TOY BUILDING SET OF METAL

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Property Custodian

Application filed February 19, 1940

This invention relates to a metal building set for children.

In the known toy building sets of metal comprising structural units that can be screwed together with the aid of uniformly spaced standard bolt holes the units chiefly consist of bars of different length from which the models to be built are assembled in skeletonlike fashion by means of screws and nuts. Building sets of this type are, however, open to the objection that they are relatively expensive and require for assembling a large number of screws the insertion and tightening of which is quite bothersome and takes up much time. Furthermore, even if closely arranged the bars or rods fail to produce a good surface effect, since the joints between the rods and the numerous bolt holes or inserted screws break the continuity of the surface, so that a miniature reproduction, particularly of objects having plain unbroken faces, frequently does not look like the original.

Proposals to the effect to improve the surface impression by the use of cardboard sheets furnished with the sets are mere makeshifts, because cardboard is subject to rapid wear and cannot serve as material for structural supports.

The invention eliminates the drawbacks mentioned by a combination of features one of which consists in employing as structural members differently colored supporting plates that are solid or appear to be so and are provided with standard perforation along their edges. These plates permit the erection of structures giving an impression of solidity and serve also as supporting members for taking up forces acting in the plane of their surface. Whereas in surfaced structures made from rods without diagonal bracing the transverse forces developing therein cause displacement of the rods relative to one another, these forces are now taken up by the plates which are real supporting units and do not require separate diagonal bracing. A proper color scheme, including for instance white, red and green, produces contrasts that please the eye.

Additional structural members according to the invention are perforated bars provided on one longitudinal edge with a narrow flange for embracing the edges of the supporting plates. In models having girderlike parts these bars form the top and bottom booms which are connected by the plates, so that the flanging engagement and a few screws suffice already to produce a rigid joint. This is due to the fact that the plates, with their long edges, are supported by

the bars or one another and thereby prevent relative motion of the joined members.

Each set further includes connecting means comprising steep-pitch screws and punched sheet metal nuts or plane or angular punched sheet metal straps serving as nuts and having at least two screw holes, each nut member possessing only one thread. The use of such connecting means simplifies and accelerates assembling, which, moreover, being punched, are cheaper than the cut threads of the screws and nuts hitherto employed in toy building sets and can be produced at a saving in material.

The straps containing at least two nuts make it possible also to assemble completely closed structures like cubes, the screws of the plate to be put on last engaging without fail the strap members located inside the structure. Being nuts themselves, the straps render the use of the usual kind of nuts unnecessary. When two building units of the known type were to be butt-jointed, it was done until now with the aid of three different connecting members, viz. straps, screws and nuts, whilst a connection according to the invention requires only two members, since strap and nut form a unitary element.

A particularly advantageous form of such a nut or strap-nut is obtained by making the thread part of a bulge pressed out of the plane of a sheet and thereby permitting springing of the connecting members when the screw is tightened, so that either the bulge moves elastically inward or the edge of the hole of the unit to be fastened is drawn into the clearance of the bulge. At any rate, the connection thus established is perfectly joltless, the bulge acting in the manner of a check nut.

The heads of the steep-pitch screws possess a square indentation to be engaged by a screwdriver having a square end. This tool is part of the equipment of each set and serves for preventing injury to colored building units which are easily damaged when ordinary slotted screw heads and wedge-pointed screwdrivers, which slip off frequently, are used.

The realistic representation of some models, such as motor cars, can be facilitated by furnishing each set with supplementary parts like engine hoods, mudguards, etc.

The invention is illustrated by way of example in the accompanying drawings comprising Figures 1 to 34.

Figs. 1 to 10 show preferred forms of supporting plates. The squares 1 shown in Figs. 1 to 3 and the triangles 2 shown in Figs. 7 and 8 have

for instance an edge length of 60 mm. The rectangular plates 3 shown in Figs. 4 to 6 have edge lengths of 60 mm. and 30 mm., and the plates 4, 5 shown in Figs. 9 and 10 have an edge length of 30 mm. It is possible of course to make use of other forms, provided the edge length fits into the system chosen. The plates are either solid or have one or more windowlike clearances 6 which do not reduce the necessary strength and which not only do not interfere with the surface effect aimed at but enhance it. The surface effect is further improved by painting the plates in contrasting colors, as white, red, green, etc.

The holes 7 near the edges of the plates have an internal diameter of approximately 3 mm., and their distance  $a$  from one another follows from the fundamental geometrical unit of the plates, i.e. a square, and amounts in this instance to 15 mm. The row of holes is removed from the edge of the plates to the extent of the distance  $b$  which is equal to 5 mm.

Figs. 12 to 15 show examples of the bars 8 forming girder booms and possessing at one longitudinal edge a flange 9 for embracing the edges of the plates in an accurately fitting manner. The lengths of the bars 8 are, respectively, 60, 120 and 180 mm., and the holes 7 as well as the distances  $a$  and  $b$  correspond to those of the plates.

Figs. 16 to 19 show longitudinally slotted bars 10 and angles 11 which as to their dimensions are adapted to the standard chosen.

Fig. 20 is a side elevation and plan on an enlarged scale of a screw 12 having three steep-pitch threads and in its head a square indentation 13.

Fig. 21 shows the associated screwdriver 14 fitted with a square working end. The screw 12 requires only a few turns for tightening.

Figs. 22 to 24 illustrate, in side elevation and plan, punched sheet metal nuts in the form of angles 15, plane straps 16 or single nuts 17 provided with a handle 18. Each strap has at least two bolt holes 19 fitted with a single thread which is produced by radially cutting the thread during punching and then twisting it.

Fig. 25 shows a nut construction on an enlarged scale. A peculiar feature of a nut according to the invention is the arrangement of the thread in a bulge 20 pressed out of the plane of the sheet metal. A strap may have more than two bolt holes and be provided also with facilitating openings 21. The handle 18 of the nut 17 may be formed of two upwardly bent opposite sheet metal edges, though handling is facilitated by bending over extended edges so as to form a bow, as indicated by broken lines.

Fig. 26 illustrates how the structural units according to the invention may be used. A surface or a girder is assembled from four bars 8 and several supporting plates 1, 3 with the aid of only four screws for each pair of bars 8, since only the ends of the bars 8 need be connected with the supporting plates 1, 3. In the structure shown four screws could be dispensed with if one long bar were to replace two butt-jointed bars above and below. For these connections screws 12 of the usual type provided with nuts 17 can be used.

Fig. 27 contrasts the representation shown in Fig. 26 and a representation of the same model in the old way by means of perforated bars. The difference in the amount of work and material required is apparent, and the general effect is also totally different.

As indicated particularly by the following examples, the invention affords an opportunity of building a very extensive range of models and of reproducing practically everything in the field of actual engineering in perfect form. This applies especially to buildings of technical character whose chief feature is a steel frame. Models built by the new toy set can, furthermore, be quickly assembled and taken apart again.

Fig. 28 shows a rectangular hollow body composed of two members 1 and four members 3 with the aid of twelve angular straps 15 and twenty-four screws 12, the faces 1 being white and the faces 3 red. By means of the strap-nuts 15 a structure of this type can be readily assembled.

Fig. 29 illustrates a chair made according to the invention from two longer and four shorter red slotted bars 10, two white supporting plates 1 and 3, six strap-nuts 15, two nuts 17 and ten screws 12 or a total of twenty-six units.

The chair shown in Fig. 30 is made from structural units of known toy sets and requires in its construction twelve perforated bars 21a, four perforated angles 22, eighteen screws and eighteen nuts 23 or a total of fifty-two units, which is twice the total needed for making a chair according to the invention.

Figs. 31, 32 are, respectively, a side and bottom view of a motor truck assembled according to the invention. The engine hood, driver's cab and car body are made from white supporting plates 3, 4, red bars 8, screws 12 and strap-nuts 15, 16, a few slotted bars 10 being used for mudguards and bumper bar and also a few screws with nuts 17 as indicated. The substructure is assembled in girderlike fashion from bars 8, slotted bars 10, slotted angles 11 and screws 12 and nuts 15, 17. The figures indicate the extremely pleasing reproduction of the model. In this connection it should be observed that the bars 8, if used for instance together with slotted bars 10 and slotted angles 11, produce extremely strong structures showing great resistance.

The wheels 24 and the axles 25 may form part of the special equipment of a set.

Fig. 33 shows a building serving for instance as railroad station or for airport purposes and clearly disclosing the remarkable surface effect of the plates 1, 3, 4 and the extremely economical use of screws 12 as a result of the employment of the supporting plates and of the bars 8. The nuts 15, 16, 17 are mostly located inside the structure. The shaded portions are red and contrast with the white of the other faces.

The members forming the toy set are arranged in the usual manner in a box 26 shown in Fig. 34. Supplementary units, as engine hood, mudguards for motor cars, etc., may also be kept in the box or supplied in separately purchasable boxes.

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