

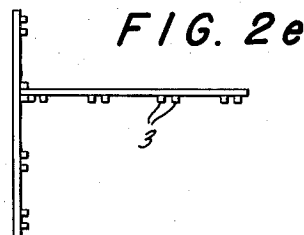
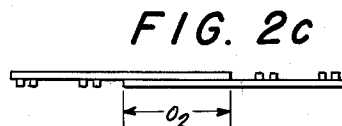
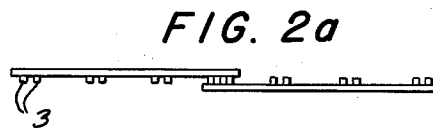
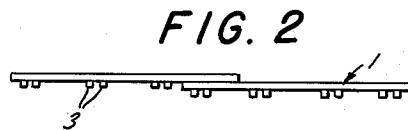
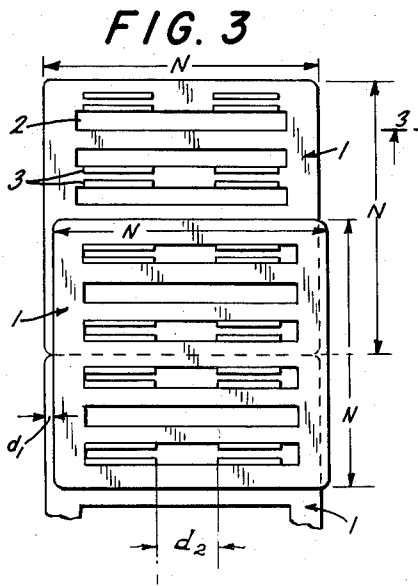
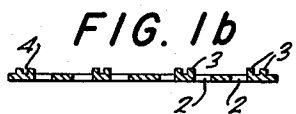
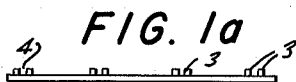
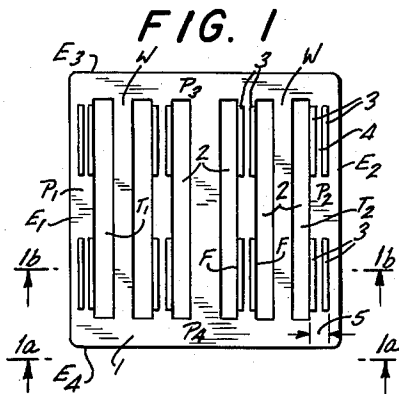
June 20, 1961

E. FRIMBERGER
MODULAR TOY STRUCTURE

2,988,844

Filed Jan. 27, 1959

3 Sheets-Sheet 1



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FIG. 4

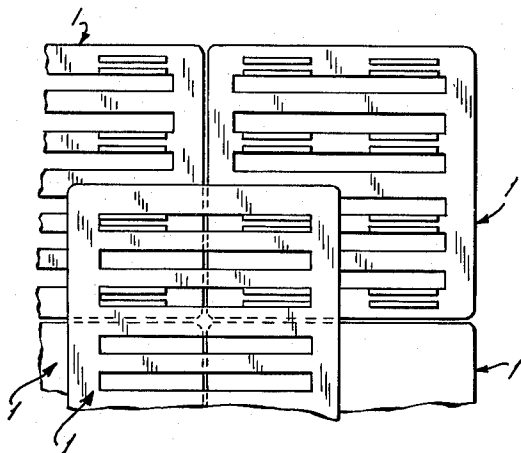


FIG. 5

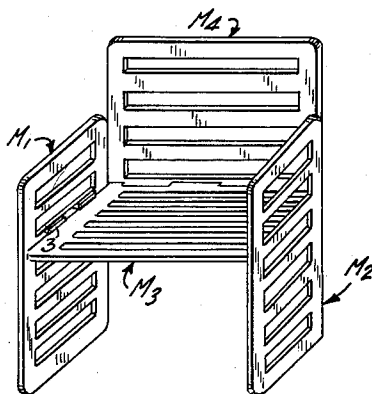


FIG. 6

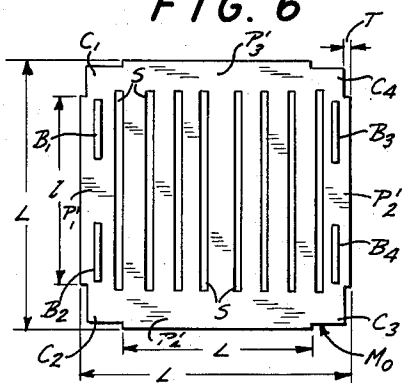


FIG. 7

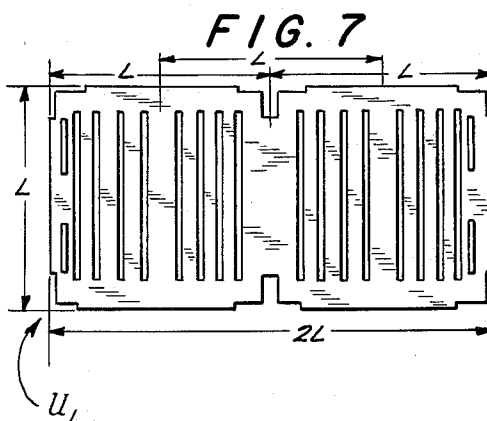
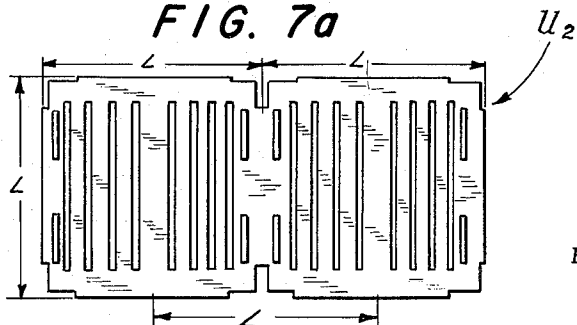


FIG. 7a



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FIG. 7b

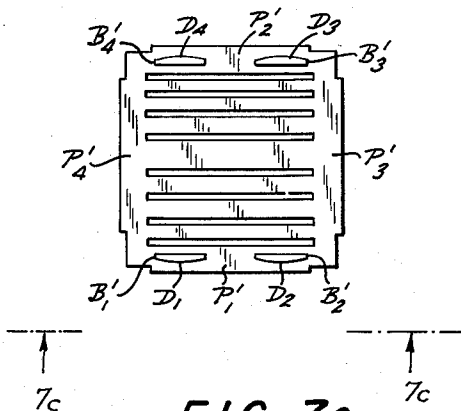


FIG. 7c



FIG. 8

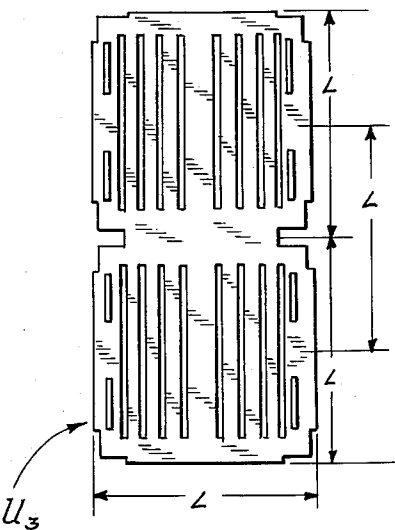


FIG. 9

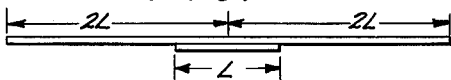


FIG. 9a

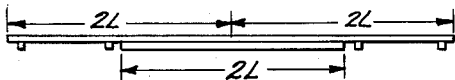
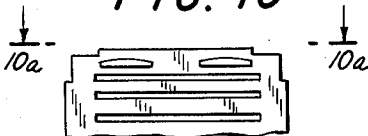


FIG. 10a



FIG. 10



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MODULAR TOY STRUCTURE

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3 Claims. (Cl. 46—30)

This invention relates to modular toy structures and more particularly to a modular component unit or modular panel unit a plurality of which may be assembled in a variety of combinations representing, for example, a set of pieces of toy furniture or the like.

One of the objects is to provide a modular component unit or modular panel inexpensively produced preferably of injection molded plastic material, of substantially rectangular configuration such that a plurality of identical panels can be assembled into a variety of desired modular structures or pieces of toy furniture by way of attaching these panel units either face-to-face in overlapping relationship or at right angles to one another with no need of any other connecting means.

More particularly, it is an object to provide such a modular panel unit to be of great simplicity as well as attractive in appearance, and shaped and constructed to readily lend itself for production by injection molding, and furthermore, so constructed that a plurality of the panel units are held connected to one another by way of being frictionally interengaged.

Another object is to provide simple identical modular panel units easily assembled by frictional engagement with one another, to provide a variety of pieces of toy furniture of basically box-shaped type, in which the panels present an attractive striped or slotted pattern such that the assembled toy furniture or the like although modular in character is particularly pleasing and attractive in appearance.

With these objects in view, the invention provides a rectangular modular component unit or modular panel preferably in the form of a plate element of substantially square configuration having a plurality of apertures as well as a plurality of projections or lugs provided upon one face of the plate element. The lugs are so arranged with respect to each other and with respect to the apertures that any one of the lugs may be frictionally engaged in and by any selected aperture in a plate element of a substantially identical panel unit when the two plate elements are placed in face-to-face or overlapping relationship with each other, and so positioned that one edge of one plate element is parallel to an edge of the other.

Preferably, the openings in the plate element are in the form of a series of slots parallel to one edge of the plate element and presenting the aforementioned decorative pattern, while the lugs are of elongate shape extending parallel to the slots.

Furthermore, the modular panel unit according to this invention is shaped with lugs as well as with recesses so arranged with respect to one another that one modular unit may be attached edge-wise to the face of an identical companion modular unit with one edge of one unit always parallel to an edge of the companion unit and with the planes of the two units extending substantially at right angles to each other to provide the basic box shape of the articles or structure to be assembled.

In one form the panel unit has a series of slots, and it also has its outer edge portions so formed that a selected edge portion of one panel unit may be inserted and frictionally held in a selected slot of a companion panel unit, with the panel units thus connected extending substantially at right angles to one another instead of face to face or overlapping.

In another form the panel unit has pairs of elongate

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lugs which are parallel to one another as well as parallel to the slots, the lugs of each pair being spaced from one another so as to accommodate and frictionally hold between them the edge portion of a companion panel unit when the panels are to be interconnected or assembled at right angles to each other, the same lugs also serving to interconnect the panels in face to face relationship when so desired, and with the lugs of each panel cooperating with the slots of the other panel.

According to the invention, various pieces of toy furniture may each be composed of a plurality of identical panel units of the character above set forth, so that in this way economically only a single mold would be required for injection molding. However, the invention also contemplates modifications combining different panel units.

Other features and advantages will hereinafter appear.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

FIG. 1 is a plan view of one form of the basic modular component unit of this invention, showing a combination of apertures and projections;

FIG. 1a is an end view of the modular unit taken on line Ia—Ia of FIG. 1;

FIG. 1b is a cross-sectional view of the modular unit taken on line Ib—Ib of FIG. 1;

FIGS. 2, 2a, 2b, 2c illustrate various ways of assembling a pair of basic modular units with various degrees and forms of overlap;

FIG. 2d shows a pair of basic modular units in overlapping relationship combined with a similar third unit;

FIG. 2e shows the modular unit of FIG. 1 assembled with an identical unit in right angle relationship;

FIG. 3 is a plan view of the sub-assembly of FIG. 2d, taken on line 3—3 of FIG. 2d, showing a composite elongate plate structure;

FIG. 4 illustrates a larger sub-assembly of basic modular units to constitute a composite plate structure;

FIG. 5 shows an example of a piece of toy furniture assembled from a plurality of the basic modular units all in right angle relationship with one another;

FIG. 6 is a plan view of another form of the basic modular component unit for a different kind of right angle connection between the similar modular component units;

FIGS. 7, 7a and 8 are examples of a duplex or double size modular unit combinable with the smaller basic modular component unit of FIG. 6;

FIGS. 9 and 9a are examples illustrating the manner in which the duplex modular units of FIG. 7 and 7a are combinable with one another;

FIG. 7b is a plan view of a single size modular unit which is a modification of the unit shown in FIG. 6;

FIG. 7c is an end view of the modular unit as seen in the direction of the arrows from the line 7c—7c of FIG. 7b;

FIG. 10 is a fragmentary plan view of a further modification; and

FIG. 10a is an end view of the modified unit as seen in the direction of the arrows from the line 10a—10a of FIG. 10.

According to the embodiment of FIGS. 1 to 5, the basic modular component unit is in the form of a plate element of substantially square shape as indicated by the dimension N, having one pair of outer edges E₁ and E₂ and a second pair of outer edges E₃ and E₄ at right

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angles to the first pair of edges. This plate element has a plurality of apertures in the form of parallel slots 2 of substantially equal widths. These slots terminate relatively short and substantially equal distances from the respective edges E_3 and E_4 of the plate element, defining edge portions P_3 and P_4 respectively of the plate element. The terminal slots T_1 and T_2 define with the respective edges E_1 and E_2 edge portions P_1 and P_2 respectively of the plate element. The slots define between them web portions W as part of the plate element.

Upon one face of the plate element are provided a plurality of elongate projections or lugs 3 arranged in pairs preferably alternating with the slots and parallel thereto, and with the distance 4 between the lugs of each pair so dimensioned that the edge portion of a companion modular component unit may be held frictionally therein by the two lugs 3, whenever a rectangular relationship between the two units is to be established. With respect to the arranging and dimensioning the lugs it is to be noted that the distance 5 between the outer faces F of each pair of lugs is such as to fit closely into any one of the slots 2 of a companion modular component unit when the units are assembled and attached to one another in overlapping relationship for instance in the manner indicated in FIGS. 2, 2a, 2b, 2c showing various degrees of overlap as well as various ways of frictional interengagement as between the lugs of one unit with the slots of the other unit, with the lugs of both units facing in the same direction (see FIG. 2), or with a pair of lugs of one unit interengaging with a pair of lugs of the other (see FIG. 2a) when the lugs of one unit are directed opposite to the other.

According to FIG. 2b, the lugs 3 of the two respective component units are directed opposite to each other, the units having a short overlap o_1 , with a pair of lugs of each unit frictionally interengaging with a respective slot of the other unit.

In FIG. 2c the arrangement is similar to FIG. 2b although providing a larger overlap o_2 in which more than one pair of lugs of each unit engage frictionally in respective slots of the companion unit.

In FIG. 2d the two units to be joined are edgewise associated and have a double overlap o_3 with a third similar modular component unit which has one half of its lugs 3 frictionally interengaged with respective slots of one companion and the other half of its lugs interengaged with respective slots of the other companion unit, this composite arrangement being more clearly shown in the plan view of FIG. 3. Accordingly, this provides a sub-assembly unit constituting the elongate plate of substantially twice the length of the basic component unit of FIG. 1. With respect to this sub-assembly, it is noted that the pairs of lugs 3 are arranged with respect to the slots so as to allow the third unit to be slightly displaced laterally a distance d_1 (FIG. 3) with respect to the two associated units. The distance d_2 longitudinally between pairs of lugs is such as to allow for even larger lateral displacement of the units to be joined so as to provide for an even larger sub-assembly in the form of the one illustrated in example FIG. 4 comprising four of the basic units combined into a single square composite plate, the four units being held together by a fifth identical unit through the interengagement of respective lugs and slots in the manner clearly visible in FIG. 4.

FIG. 2e illustrates the manner in which a pair of basic modular component units of the embodiment of FIG. 1 can be frictionally connected with and held by one another in right angle relationship, that is with the plane of the one unit directed normal to that of the other, by having one edge portion of one unit fitted into the space 4 between at least one pair of lugs 3 of the other unit and frictionally held thereby.

FIG. 5 represent an example of the manner in which the rectangular connection of FIG. 2e may be utilized in the assembly of a piece of toy furniture such as a toy

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chair composed of four basic identical modular units M_1 , M_2 , M_3 , M_4 . In this instance a pair of vertical lateral units M_1 and M_2 provide the support as well as arm rests for the horizontal unit M_3 which provides the seat proper the lateral edge portions of which are frictionally connected and held by respective pairs of lugs 3 in the manner indicated in FIG. 2e, with all other lugs on the units M_1 and M_2 here omitted for the sake of simplification. The fourth unit M_4 being vertically disposed and rising above the arm rests of the side units is similarly connected to the rear edge portion of the horizontal or seat unit M_3 by suitable pairs of lugs 3, again with all other lugs of this unit omitted for the sake of simplification.

While the modular units of FIG. 1 will lend itself to combinations involving for instance the assemblies of FIG. 2 through FIG. 5 and many others to provide entire sets of toy furniture such as tables, beds, shelves, chairs, etc., such pieces may equally be assembled by the use of another form of a modular component unit M_0 such as is illustrated in FIG. 6.

The modular unit of FIG. 6 has slots S and features specially shaped outer edge portions P_1' , P_2' , P_3' , P_4' formed by recessed or relieved corners C_1 , C_2 , C_3 , C_4 , providing elongate projections of relatively reduced length l designed to fit into any of the slots S of a companion unit for the purpose of establishing therewith the rectangular connection. Any one of the reduced edge portions P_1' to P_4' may thus be inserted into and frictionally held in and by any one of the slots S of the companion unit, the relief or recess at the corners being preferably such that the length l of the reduced edge portion is slightly shorter than the length of the slots S and the extent T of their projection substantially not greater than the depth of the slots or the thickness of the companion unit. A pair of longitudinally aligned projections B_1 and B_2 are provided on one face of the unit on the edge portion P_1' , and another pair of similar projections B_3 and B_4 on the opposite edge portion P_3' , and it will be understood that in the modular unit of FIG. 6 the arrangement of the slots S , the projections or lugs B_1 to B_4 , and the reduced edge portions P_1' to P_4' , all with respect to one another is such as to permit assemblies in any of the desired combinations aforementioned involving those sub-assemblies in which a plurality of the basic units may be combined in a single plane to constitute a larger plate such as a toy table top or the like, as well as those sub-assemblies in which the basic units are combined in rectangular relationship to one another.

Referring to FIGS. 10 and 10a, a specific refinement may be added to the form of modular unit shown in FIG. 6, for the purpose of improving the frictional hold of these basic component units with respect to one another. To this end, FIG. 7b shows the projections or lugs B_1' to B_4' to have slightly convexly shaped outer lateral faces designated as D_1 to D_4 respectively. With these convexities the lugs may be forced easily yet tightly into respective slots or gaps in the companion unit whenever the units are to be combined in any overlapping relationship substantially in the manner indicated in FIG. 2 through FIG. 2d as initially described in the case of the basic component unit of FIG. 1.

Also, the thickness of the edge portions P_1 - P_4 of certain blocks may be increased by providing said portions with bulges D_5 whereby when one of said edge portions is inserted in a slot of an adjacent block, the sides of said one edge portion will engage the sides of said slot with a tighter frictional fit.

According to the invention, the basic modular unit in the form of FIG. 6 may be embodied in a duplex unit such as is represented with slight modification in FIGS. 7, 7a, and 8 respectively. Such duplex units are structurally the simplified equivalent of the composite units or sub-assembly exemplified in FIG. 3. While in the duplex unit the overall width L may be the same as that

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of the FIG. 6 embodiment of the basic square unit, the overall length of the duplex unit appears substantially as twice the length L and is therefore designated $2L$ in these examples. In the duplex unit U_1 of FIG. 7 a pair of elongate lugs parallel to the slots is provided only at each end the slots being arranged transversal of the unit and parallel to the slots. In the duplex unit U_2 FIG. 7a two pairs of symmetrically arranged similar lugs have been added to the intermediate portion of this unit. The duplex unit U_3 of FIG. 8 has the same peripheral outline as those of FIGS. 7 and 7a, but with the slots longitudinally arranged and with four pairs of elongate lugs provided parallel to the slots.

FIGS. 9 and 9a illustrate the manner in which a pair of duplex units of either FIG. 7 or 7a may be longitudinally combined in the identical plane by the inclusion of an overlapping connector member which as in FIG. 9 may be in the form of the basic modular unit of FIG. 6 or even in the form of a third duplex unit (see FIG. 9a) longitudinally overlapping the two other duplex units.

The modular component embodying the features of this invention has no undercuts, and is preferably and inexpensively produced by injection molding.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of modular toy structures differing from the types described above.

While the invention has been illustrated and described as embodied in modular toy furniture, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. An injection molded modular component unit for a toy assembly comprising a substantially rectangular plate element having a plurality of apertures in the form of parallel slots parallel to one outer edge of the plate element, said slots being of substantially equal width and terminating relatively short and substantially equal distances from respective outer edges of the plate element, and having a plurality of projections comprising a plurality of lugs on one face of the plate element as well as elongate projecting portions constituting portions of at least some of the edge portions of the plate element, said projections being so arranged relative to said apertures and to one another that any one of the projections is adapted to be held in frictional interengagement with any selected slot of a similar modular component unit when the plate elements are placed in overlapping relationship with one pair of outer edges of the one plate element paralleling corresponding edges of the other plate element, and also where one of said plate elements is placed at right angles to the plane of the other plate

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element with one pair of edges of the plate element paralleling corresponding edges of the other plate element, said elongate projecting portions being of slightly enlarged thickness intermediate the ends to slightly exceed the width of the cooperating slots so as to effect tight frictional interengagement therewith.

2. An injection molded modular component unit for a toy assembly comprising a substantially rectangular element having a plurality of apertures in the form of parallel slots parallel to one edge of the plate element, said slots being of substantially equal width and terminating relatively short and substantially equal distances from respective outer edges of the plate element, and having a plurality of projections comprising a plurality of elongate lugs parallel to said slots on one face of the plate element as well as elongate projecting portions constituting at least some of the edge portions of the plate element, said projections being so arranged relative to said apertures and to one another that any one of the projections is adapted to be held in frictional interengagement with any selected slot of a similar modular component unit when the plate elements are placed in overlapping relationship with one pair of outer edges of the one plate element paralleling corresponding edges of the other plate element, and also when one of said plate elements is placed at right angles to the plane of the other plate element with one pair of edges of plate element paralleling corresponding edges of the other plate element, said elongate lugs as well as said elongate projecting portions being of slightly enlarged thickness intermediate the ends to slightly exceed the width of the cooperating slots so as to effect tight frictional interengagement therewith.

3. A modular component unit for a structural toy assembly comprising, a substantially rectangular plate element having a first pair of parallel outer edge portions and a second pair of parallel outer edge portions at right angles to the first pair, and having a plurality of parallel slots of substantially equal width parallel to one pair of edge portions and terminating relatively short and substantially equal distances from respective edges of said second pair of edge portions, and having a plurality of lug portions provided on one face of said plate element parallel to said slots comprising a plurality of pairs of parallel elongate lugs, the lugs of each pair being spaced a predetermined distance from each other so as to provide between them a space for frictional engagement therein of the edge portion of a similar component unit with the planes of the plate element of said component units extending substantially at right angles to each other when so assembled, said pairs of lugs also arranged relative to each other and relative to said slots, so that any one of said pairs of lugs is adapted to frictionally interengage with any selected slot of a similar element when said elements are placed in face to face relationship therewith and with the slots of both component units paralleling one another.

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