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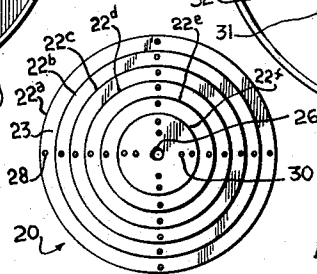
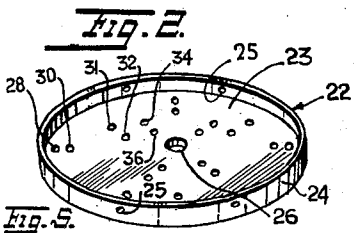
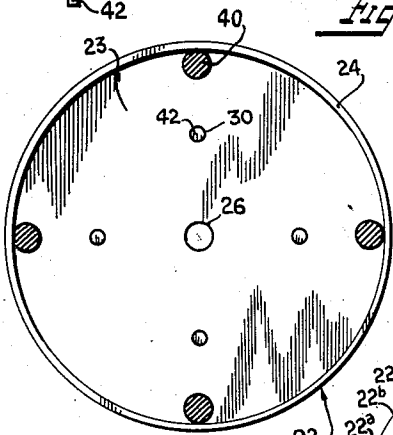
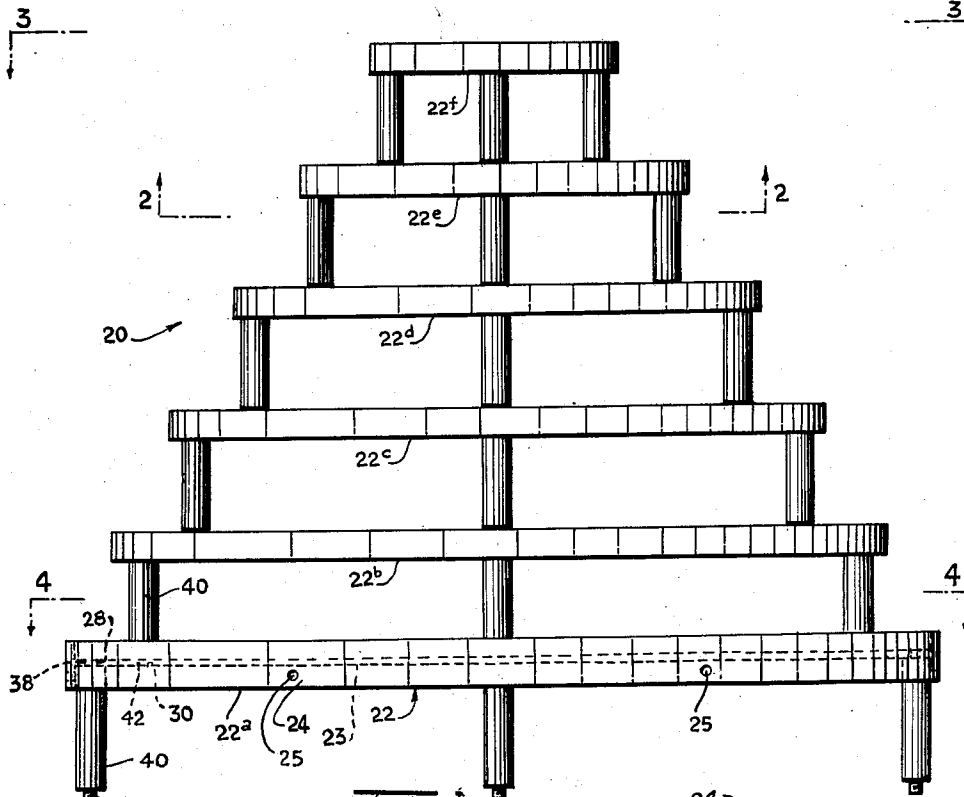
I. MALBIN ETAL

3,115,253

NESTED LADDER

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3 Sheets-Sheet 1



INVENTORS
ISAAC MALBIN
ANTHONY MADDALENA

BY *Isaac Malbin*
ATTORNEY

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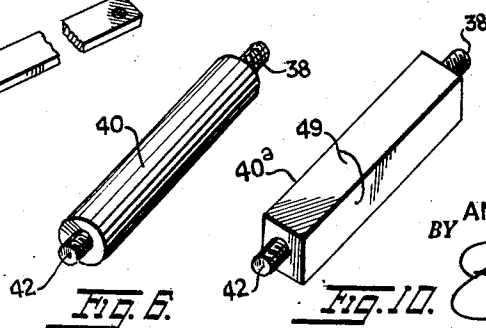
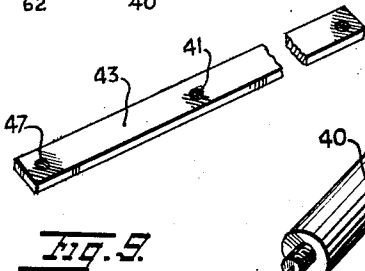
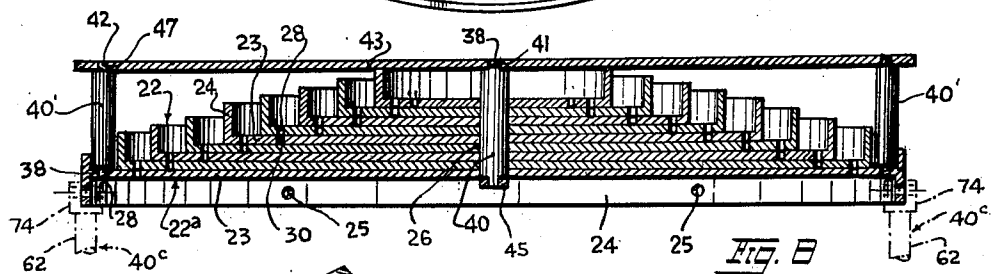
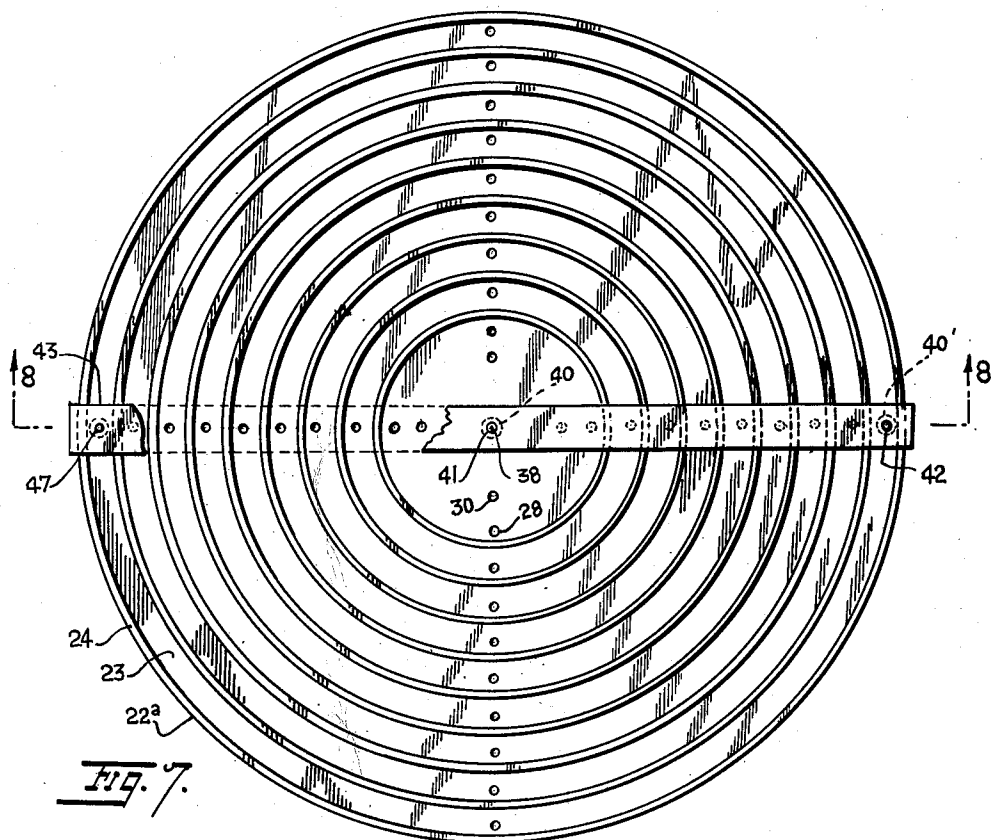
I. MALBIN ET AL

3,115,253

NESTED LADDER

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3 Sheets-Sheet 2



INVENTORS
ISAAC MALBIN
ANTHONY MADDALENA
BY *Golden Polach*
ATTORNEY

Dec. 24, 1963

I. MALBIN ETAL

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3 Sheets-Sheet 3

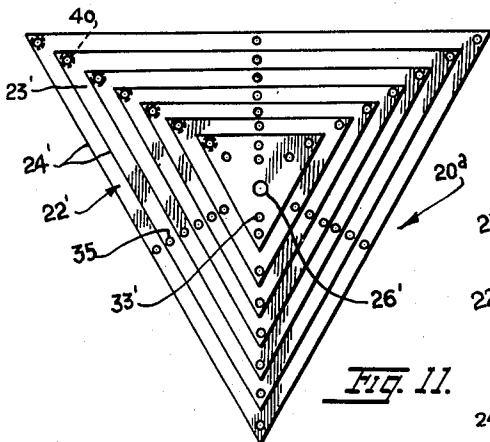


Fig. 11.

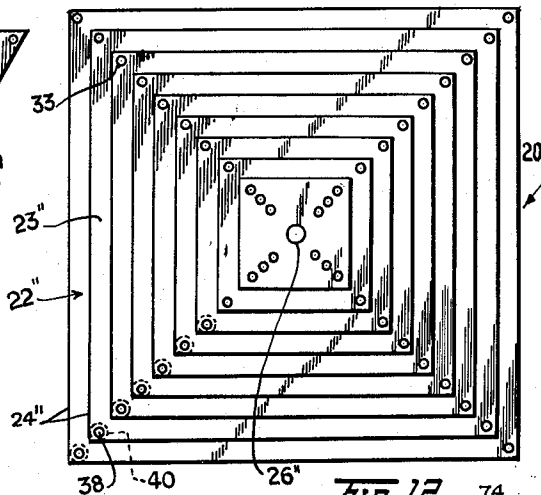


Fig. 12.

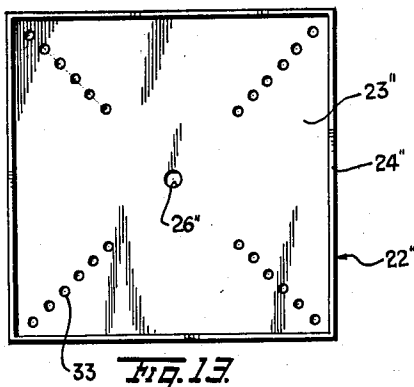


Fig. 13.

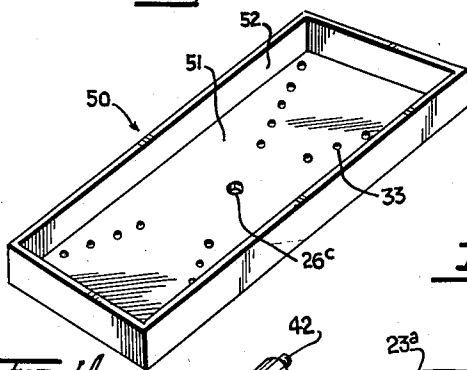


Fig. 14.

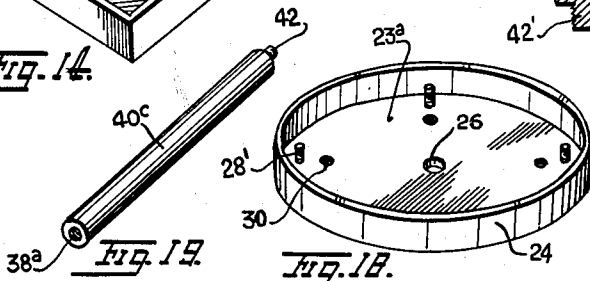


Fig. 15.

Fig. 16.

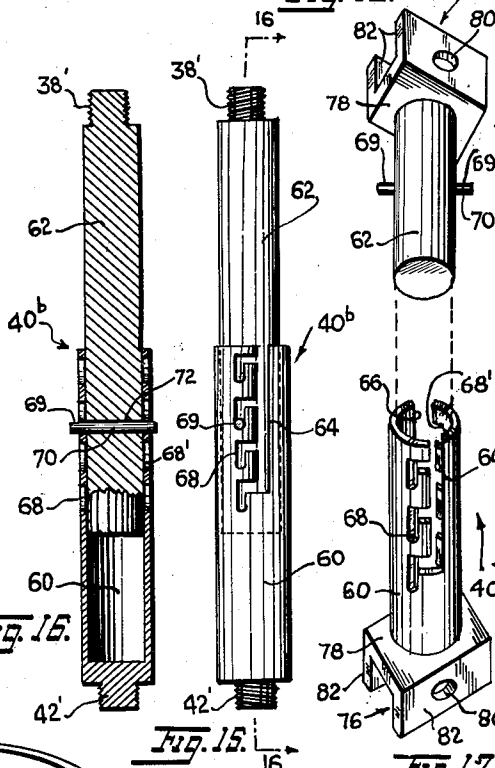


Fig. 17.

Fig. 18.

INVENTORS
ISAAC MALBIN
ANTHONY MADDALENA
BY *John Polachek*
ATTORNEY

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3,115,253

NESTED LADDER

Isaac Malbin, 201—23 Brighton 1st Road, and Anthony Maddalena, 733 E. 4th St., both of Brooklyn, N.Y.

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1 Claim. (Cl. 211—128)

This invention concerns a frame construction.

The invention is particularly directed at a structure adapted for general use and application as a ladder, bridge support, toy construction, furniture and other items of like character. The structure is of knockdown type and can be readily disassembled and packed in a nested arrangement to facilitate storage and shipment. The structure may be made of metal, wood, plastic or other rigid materials. According to the invention there is provided a plurality of flanged panels or shelves which may be round, square, triangular, rectangular, hexagonal or of other geometrical shape. The panels are of different sizes. Threaded holes in the panels receive threaded ends of posts which secure the panels horizontally together in a spaced, vertical array. The posts may be round, square or have other geometrically shaped cross sections. Opposite ends of the posts are provided with studs having respectively right-hand and left-hand threads and the holes in the panels are correspondingly threaded so that the panels can be quickly assembled into stacked array by threaded engagement with the posts. The posts may be one-piece rigid units or may be formed of a plurality of parts which fit adjustably and telescopically one in the other for varying the lengths of the posts. The assembled frame structure may have two or more stacked panels and can be used as a ladder, tiered table or stand, building or bridge support, pier, column and the like. The panels and posts may be made in miniature form for use as a building or construction type of toy for amusement and educational purposes.

It is therefore one object of the invention to provide a multiple panel frame structure in which the several panels are connected by axially vertical posts in spaced parallel array.

A further object is to provide a structure as described wherein the posts are formed of telescopically arranged parts.

Still another object is to provide a structure as described wherein the panels have peripheral flanges to reinforce the structure and are provided with a plurality of holes having alternately right- and left-hand threads engaging correspondingly threaded studs on opposite ends of the posts.

A still further object is to provide a frame structure as described wherein either the panels or the posts or both are provided with threaded studs for engaging in threaded holes in the posts or panels or both.

For further comprehension of the invention, and of the objects and advantages thereof, references will be had to the following description and accompanying drawings, and to the appended claim in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:

FIG. 1 is a side elevational view of a frame structure according to the invention.

FIG. 2 and FIG. 4 are horizontal sectional views taken on lines 2—2 and 4—4, respectively, of FIG. 1.

FIG. 3 is a top plan view on a reduced scale of the structure taken on line 3—3 of FIG. 1.

FIG. 5 is a perspective view of a frame panel in inverted position.

FIG. 6 and FIG. 10 are perspective views of posts employed in the frame structure.

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FIG. 7 is a top plan view of a disassembled group of panels arranged in nested array for storage and shipment, parts being broken away.

FIG. 8 is a sectional view taken on line 8—8 of FIG. 7.

FIG. 9 is a perspective view of a connecting bar employed in the structure of FIG. 7, the bar being shown broken away.

FIGS. 11 and 12 are top plan views similar to FIG. 3 of other frame structures according to the invention.

FIG. 13 is a top plan view of a panel employed in the structure of FIG. 12.

FIG. 14 is a perspective view of another panel which may be employed in a frame structure.

FIG. 15 is a side elevational view of a modified telescopic type of post which may be used in erecting the frame structure.

FIG. 16 is a sectional view taken on line 16—16 of FIG. 15.

FIG. 17 is a disassembled view of another modified form of post.

FIG. 18 is a perspective view similar to FIG. 5 showing another modified form of panel construction.

FIG. 19 is a perspective view similar to FIG. 6 showing another modified form of post construction.

Referring first to FIGS. 1—6, there is shown a frame structure 20 formed of a plurality of horizontally disposed shelves or panels 22. The panels are designated respectively 22^a—22^f. More or less than six panels may be used in the assembled frame structure. Each panel includes a circular plate 23 with an endless peripheral flange or skirt 24. The flange stiffens the structure of the panel and also serves as a wall to adapt the panel for use as a tray when inverted as shown in FIG. 5. The flange 24 is formed with spaced holes 25. Each plate 23 has a circular hole 26 for use in a manner described below. Circumferentially spaced holes 28 are located near the flange 24 and further holes 30 are radially spaced inward of holes 28. The holes 28 have threads of one hand, left-hand threads for example, and the holes 30 have threads of opposite hand, right-hand threads, for example.

Additional pairs of radially spaced oppositely threaded holes 31, 32 and 34, 36 may be provided in circumferentially spaced positions in the plates 23; see FIG. 5. The several outer holes 28 are adapted to engage threaded studs 38 at ends of cylindrical posts 40. Threaded studs 42 at the other ends of the posts engage in holes 30. The studs 38 and 42 are oppositely threaded and their threading corresponds to the threading of the holes 28, 30, respectively. This arrangement permits two panels to be horizontally disposed and vertically spaced one over the other. The lower studs 42 of the posts will be initially screwed one turn into the holes 30 of the lower panel. Then the upper panel will be placed on the upper studs of the vertical posts with holes 28 in registration with upper studs 38. By turning the posts, the studs will complete engagement in both aligned holes 28, 30 of the superimposed panels simultaneously.

In the structure of FIGS. 1—4, four posts 40 support each panel and the structure above the supported panel. The panels are successively smaller in diameter from bottom to top of the structure. This defines a stepped array which can be used as a ladder, bridge support, building column or pier or the like. If it is desired to mount a panel on another which is two or more sizes larger, then the inner holes 31, 32 or 34, 36 will be used for engaging the studs of the posts.

FIGS. 7 and 8 show how the panels 22 may be nested one in the other in adjacent stacked array in inverted position. A single post 40 is inserted through the registering central holes 26. Upper stud 38 engages in the cen-

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tral threaded hole 41 of a crossbar 43. The lower stud 42 is engaged by a nut 45. Crossbar 43 is a rectangular member as shown in FIG. 9. It has threaded end holes 47 which engage studs 42 of outer posts 40'. The studs 38 of posts 40' engage in holes 28 of the largest panel 22^a. This forms a compact assembly especially adapted for storage and shipment. The bar 43 may serve as a handle for lifting by hand or crane, depending on the size and weight of the panels.

FIG. 10 shows post 40^a having a rectangular cross section and rectangular sides 49. Threaded studs 38 and 42 are provided at opposite ends in the same manner as for post 40.

FIGS. 11 and 12 show frame structures 20^a and 20^b respectively formed of triangular panels 22' and square panels 22'', respectively. Holes 26' and 26'' are centrally located in alignment in the plates 23' and 23'' respectively of the several panels. Peripheral endless flanges 24' and 24'' are provided on the respective panels, and posts 40 may be used to secure the several panels together in stepped array.

FIGS. 12 and 13 show holes 33 in the square plates 23' of the panels arranged on diagonal lines. The holes are alternately provided with left-hand and right-hand threads for engaging the posts. By employing a series of holes extending from each corner of each panel it is possible to secure together panels having different sizes to form arrays other than the regularly stepped array of FIG. 12. The panels 22' of FIG. 11 have two or more holes 33' extending inwardly from the corners of the triangular plates 23' of the panels. Additional threaded holes 35 may be provided extending along lines perpendicular to the edges of the plates 23'. Thus, the triangular panels 22' may be joined by three posts at the corners, or any combination of posts at the corners and points between the corners.

FIG. 14 shows a panel 50 having a rectangular plate 51 with peripheral flange 52 all around. Diagonally disposed spaced threaded holes 33 such as provided in the plate of the square plate 23'' are formed in the rectangular plate 51. Central hole 26^c is also provided for receiving a post 40 when nesting and stacking a plurality of panels 50 of different sizes, in a manner similar to that illustrated in FIG. 8.

FIGS. 15-16 show a modified form of post 40^b formed of two parts. Sleeve 60 receives cylindrical bar 62. Studs 38' and 42' are formed at the ends of the bar 62 and sleeve 60, respectively. Diametrically opposed longitudinal slots 64, 66 are formed in the sleeve. L-shaped bayonet slots 68, 68' extend laterally from the slots 64, 66 and receive protruding ends 69 of a pin 70 extending diametrically through a hole 72 in the bar 62. This arrangement of pin and slot permits the bar and sleeve to be telescopically and adjustably fitted one in the other and locked in position. Posts 40^b thus assembled can be used in place of posts 40 for joining the several panels 22, 22', 22'' and 50 described above. The telescopic arrangement of the posts permits the panels to be adjustably spaced.

The modified form of post 40^c shown in FIG. 17 differs from the post 40^b of FIGS. 15 and 16 merely in that the threaded studs 38' and 42' have channel-shaped bearing members 74 and 76, respectively threaded thereto. The

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channel members have central threaded openings in their bases 78 to receive the studs and are formed with aligned holes 80 in the side walls 82 thereof. Posts 40^c are shown in operative supporting position in outline in FIG. 8, wherein the channel-shaped bearing member 74 straddles the flange 24 and is secured thereto by a pin like pin 70 shown in FIG. 17 extending through a hole in the flange 24 and through the aligned holes 80 in the bearing member. By reason of this construction, units can be stacked one upon another and no turning of the post is necessary to assemble the frame structure.

FIGS. 18 and 19 show studs 28' extending from the underside of plate 23^a in place of holes 28; and hole 38^a is formed in post 40^c in place of stud 38. This arrangement illustrates that the holes and studs of the panels and posts previously described may be interchanged in position without basically altering the manner of joining the several panels together. Studs 28' will engage in holes 38^a. Holes 30 will receive studs 42 of posts 40^c.

The invention thus described provides a knockdown frame structure of general utility for applications in building, furniture and toy construction, advertising and merchandising displays and a variety of other purposes.

While we have illustrated and described the preferred embodiments of our invention, it is to be understood that we do not limit ourselves to the precise constructions herein disclosed and that various changes and modifications may be made within the scope of the invention as defined in the appended claim.

Having thus described our invention, what we claim as new, and desire to secure by United States Letters Patent is:

A frame structure, comprising a plurality of panels, each of said panels including a flat plate having a peripheral endless flange extending perpendicularly to said plate to stiffen the panel, the plates of the panels having differently sized plane areas, a plurality of posts disposed axially perpendicular to and between the plates, and quickly detachable and engageable means at opposite ends of the posts and at circumferentially spaced positions of the plates holding the ends of the posts to the plates whereby the panels are held in horizontal positions in a vertically spaced stacked array, said means including threaded studs on the ends of the posts and channel-shaped bearing members threaded onto the studs, the side walls of said bearing members having aligned holes to receive a pin for fastening the bearing members to the flanges of the plates.

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