United States Patent

Anderson

[15] **3,658,382**

[45] **Apr. 25, 1972**

[54] MODULE FRAMES FOR STANDARDIZED UPHOLSTERY TYPE FURNITURE AND METHOD OF CONSTRUCTING AND ASSEMBLING SAME

[72] Inventor: **Victor F. Anderson,** Wenonah, N.J.

[73] Assignee: **Shell Oil Company,** New York, N.Y.

[22] Filed: **Apr. 2, 1970**

[21] Appl. No.: **25,191**

[52] **U.S. Cl.**.....**297/445,** 297/248, 297/443, 297/422, 287/20.92

[51] **Int. Cl.**.....**A47c 5/00,** A47c 3/00, A47c 7/20, F16b 7/00

[58] **Field of Search**.....29/428; 297/232, 233, 248, 297/440, 445–452, 456, 416, 418, 421; 248/188; 187/20.92

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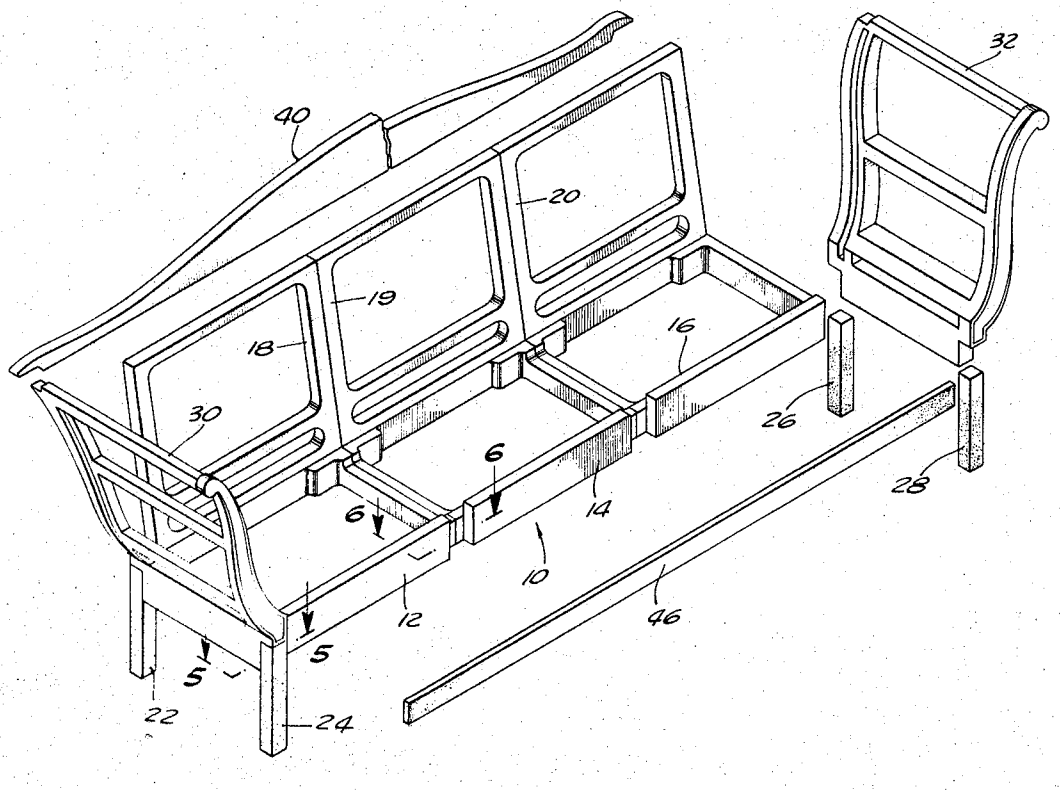
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Primary Examiner—Casmir A. Nunberg
Attorney—Beehler & Arant and Joseph W. Brown

[57] **ABSTRACT**

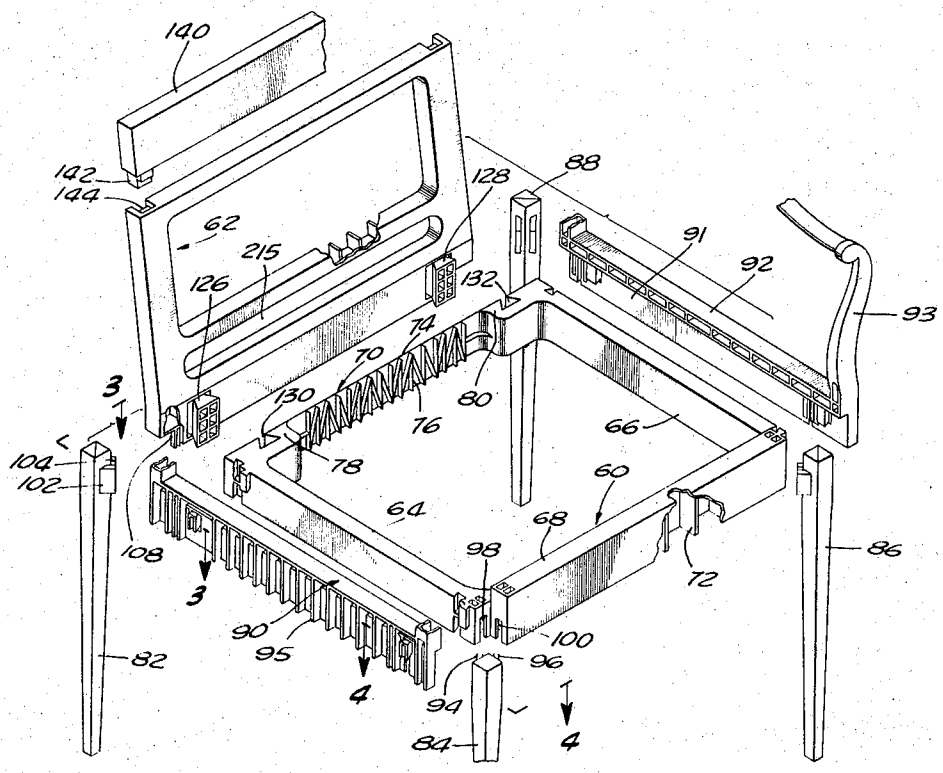
A standardized frame assembly for a sofa or chair comprising a standardized seat frame and back frame of a synthetic resin, the frames including projections and complementing slots for ease of manufacture, added strength and for allowing economical assembly with each other and accessory pieces such as a set of legs and side panels which give the sofa or chair its styling characteristic. The frames may be embodied as one piece elements, as a set of elongated elements and corner mounts or as a closed metal loop with elongated elements to give the frame a body to attach upholstery.

4 Claims, 21 Drawing Figures



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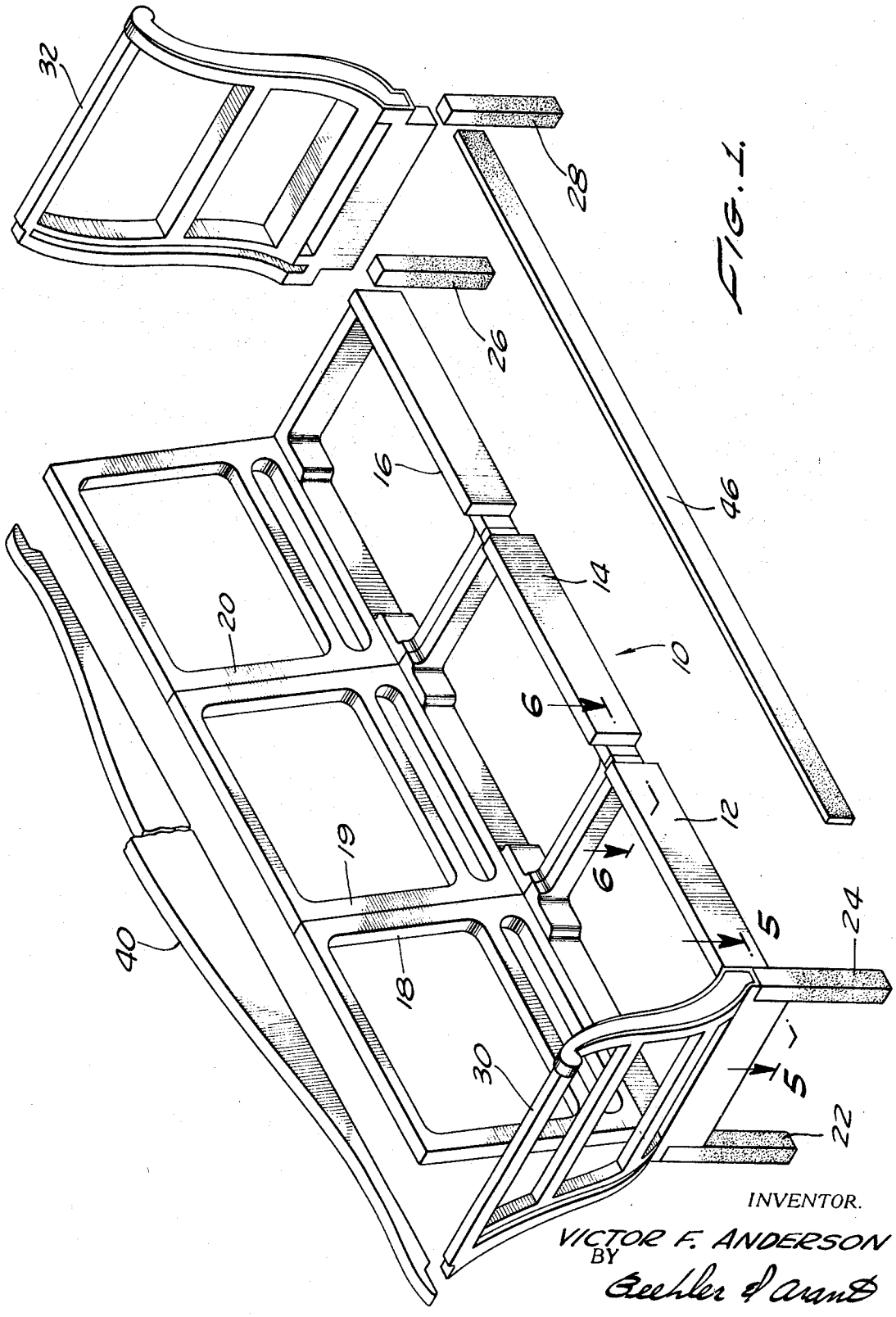


FIG. 1.

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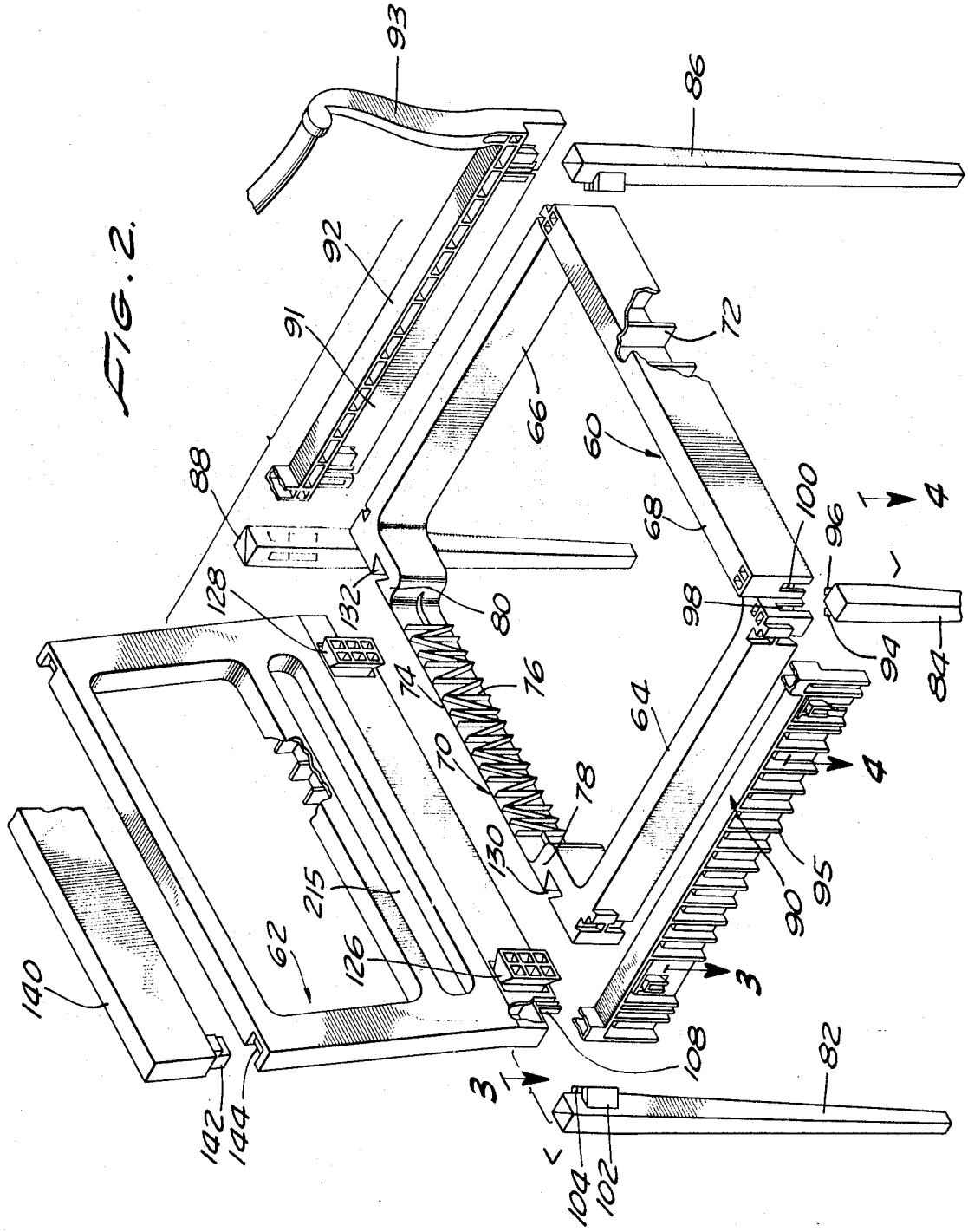
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FIG. 2.



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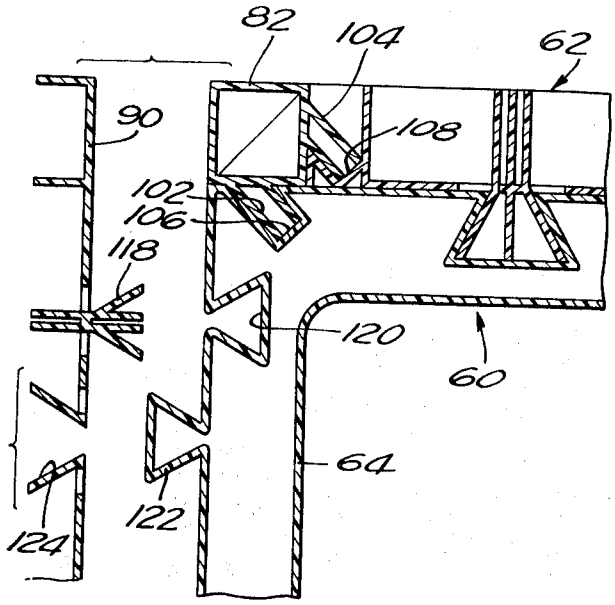


FIG. 3.

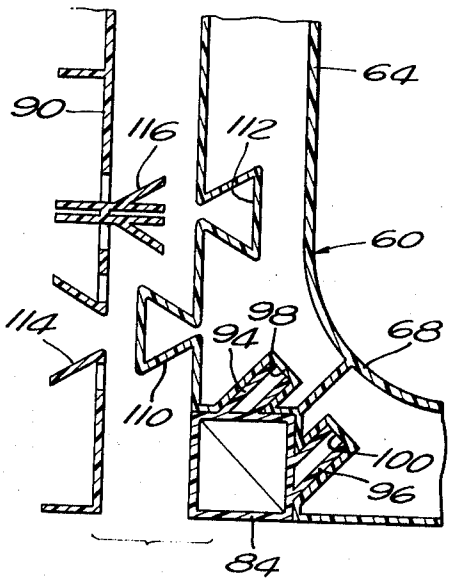


FIG. 4.

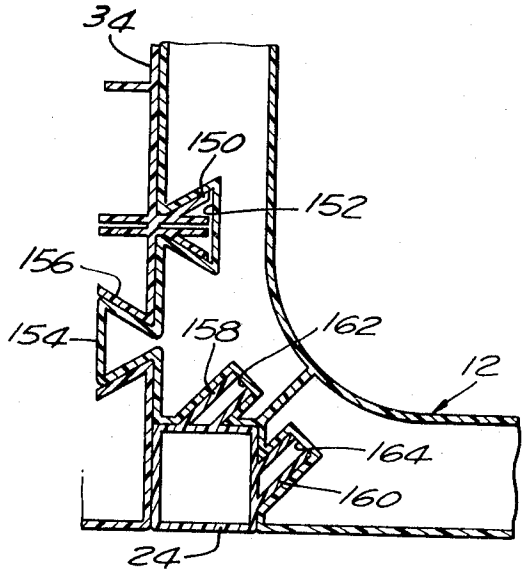


FIG. 5.

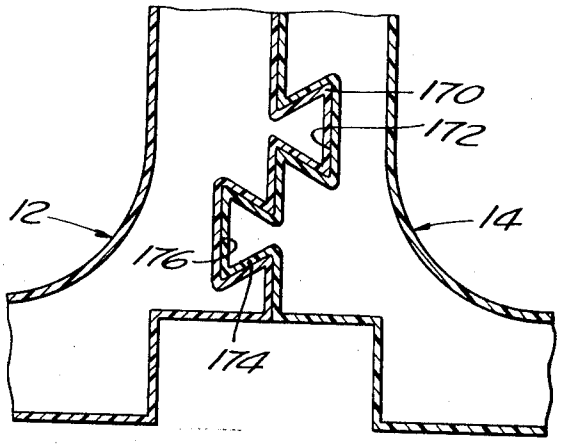
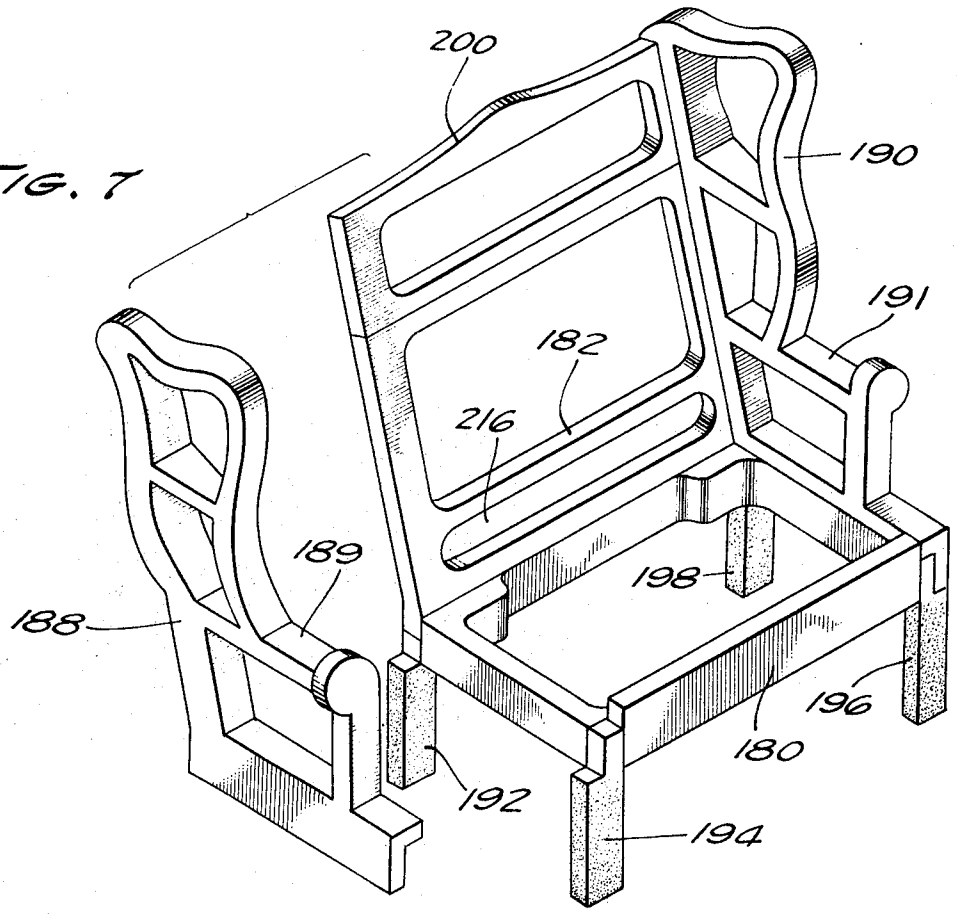


FIG. 6.

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FIG. 7



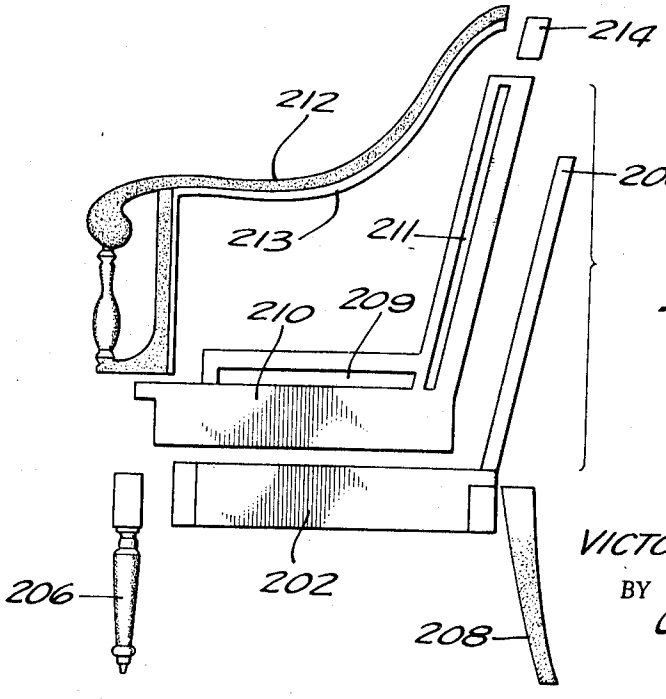


FIG. 8.

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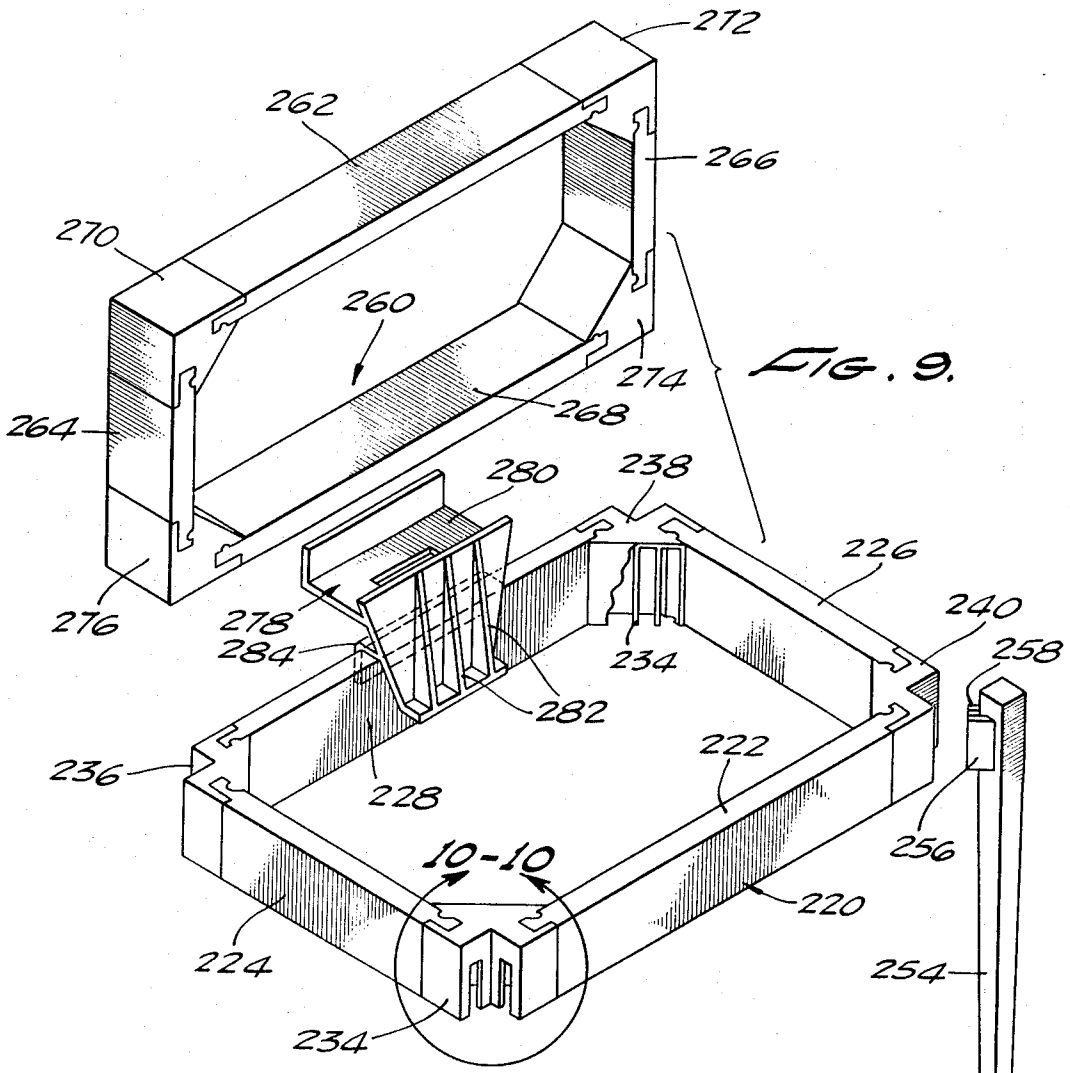


FIG. 9.

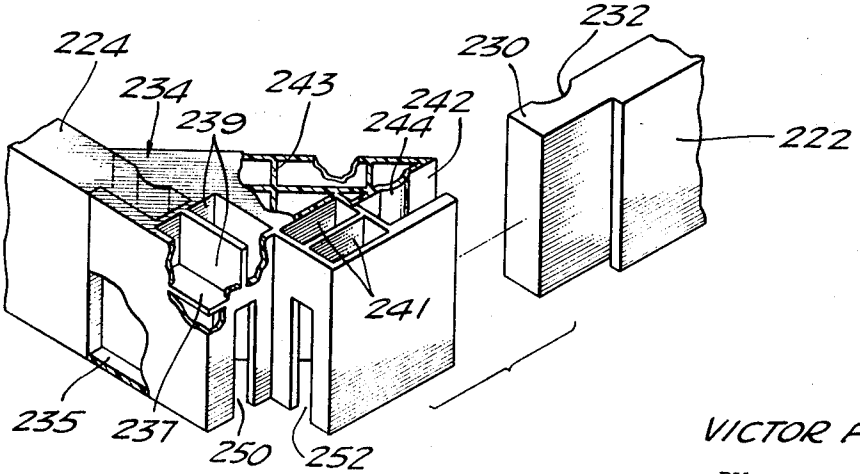


FIG. 10.

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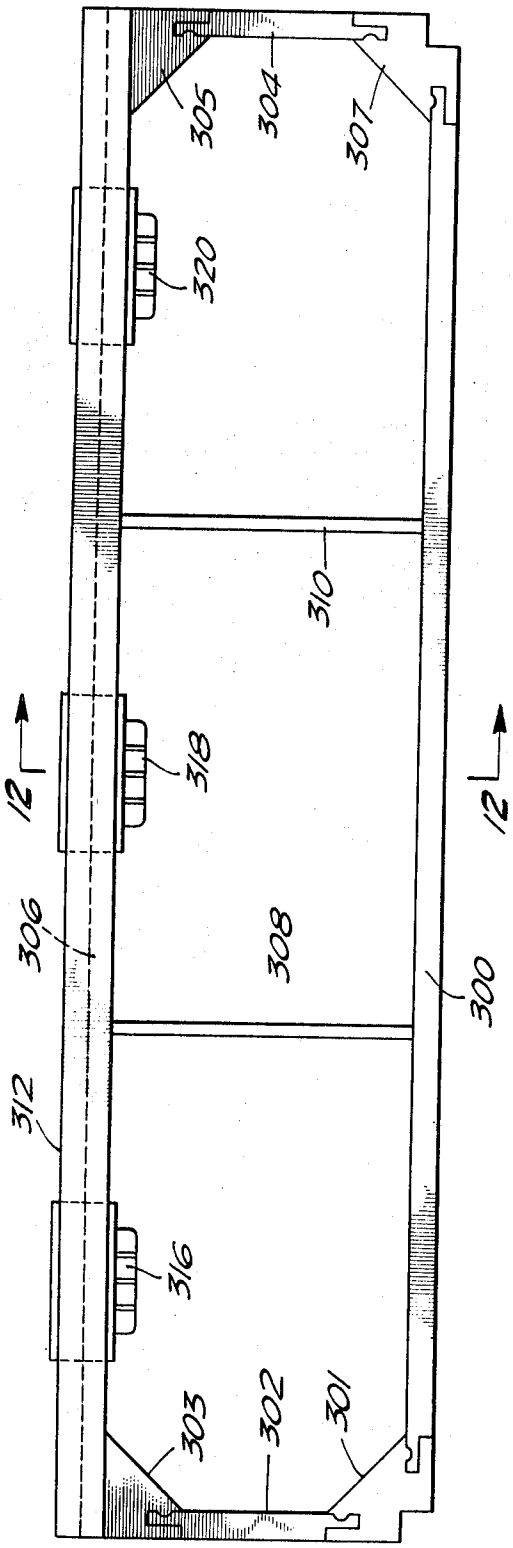


FIG. 11.

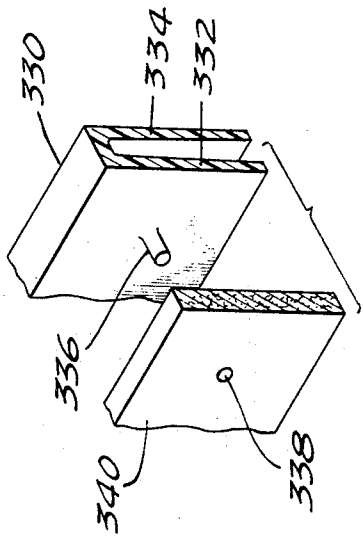


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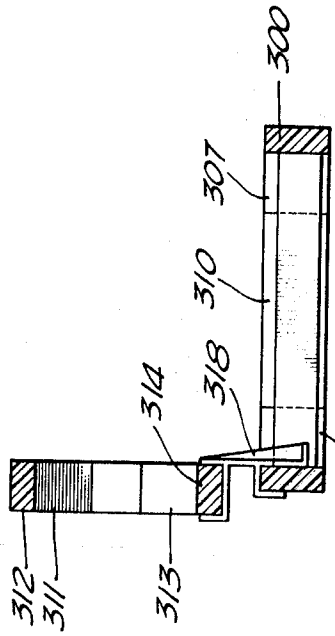


FIG. 12.

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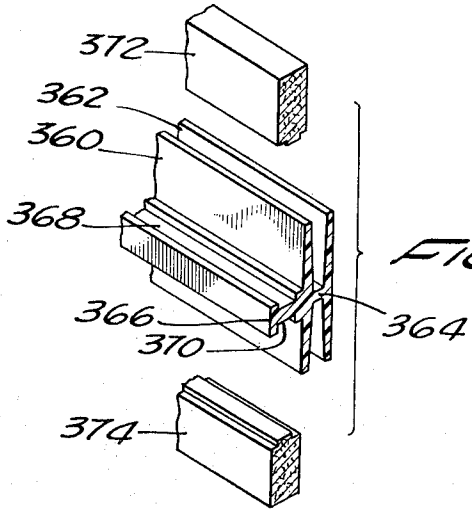


FIG. 15.

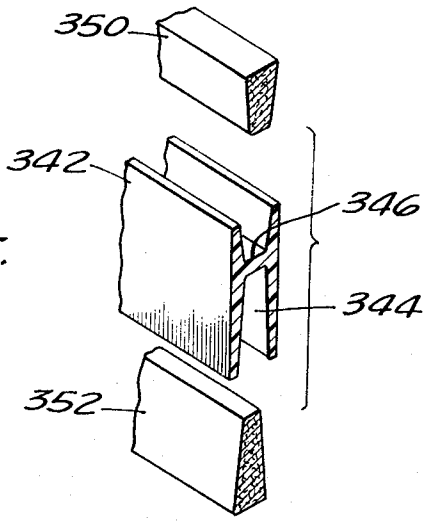


FIG. 14.

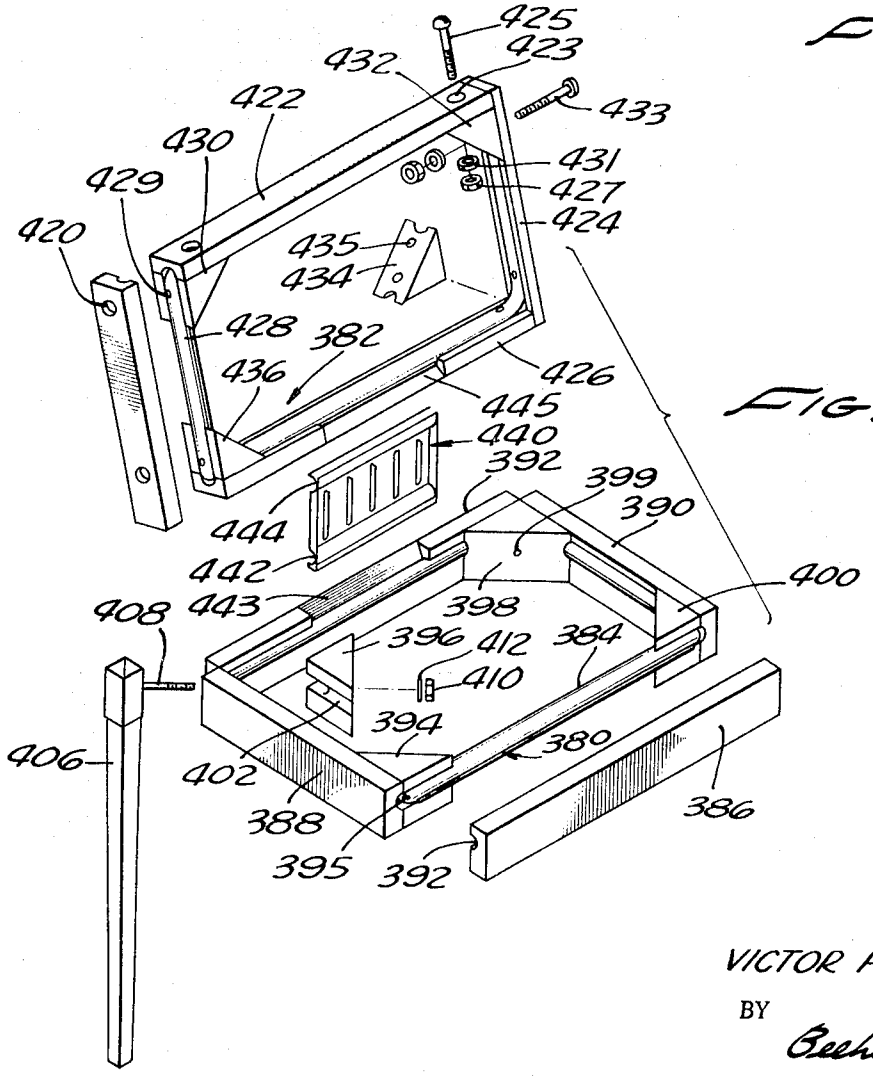


FIG. 16.

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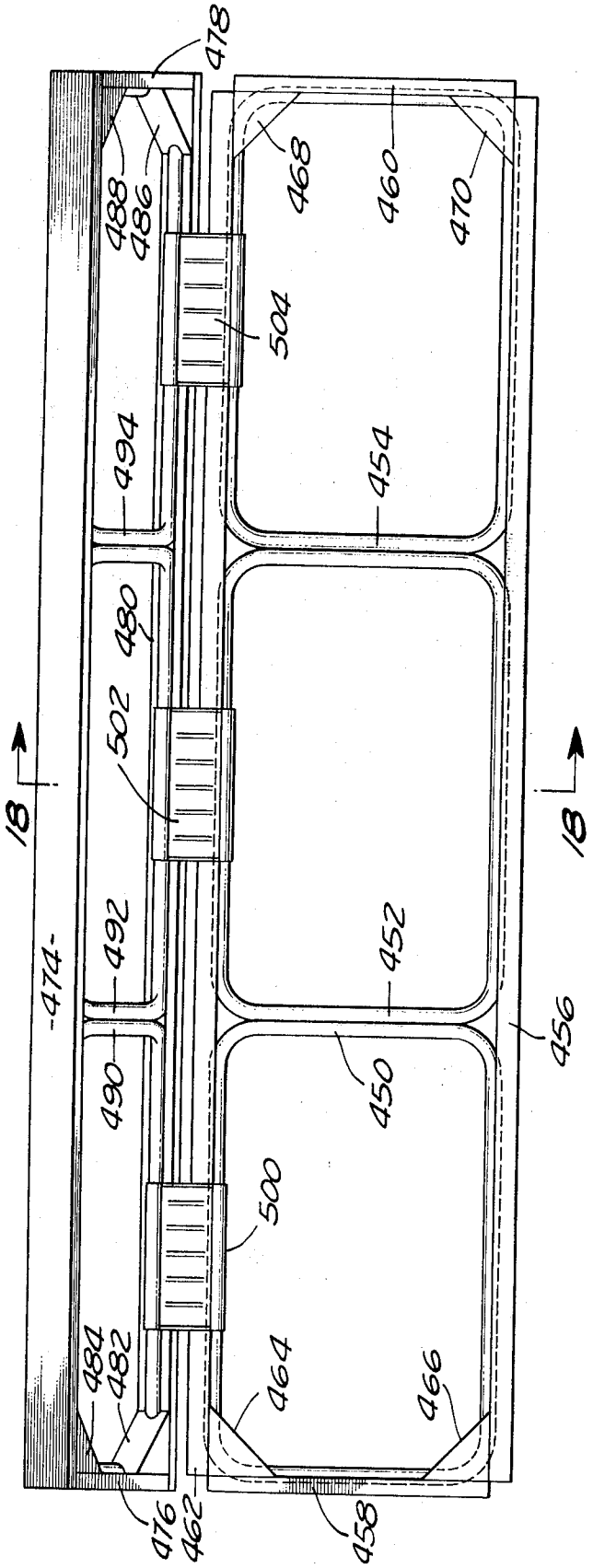
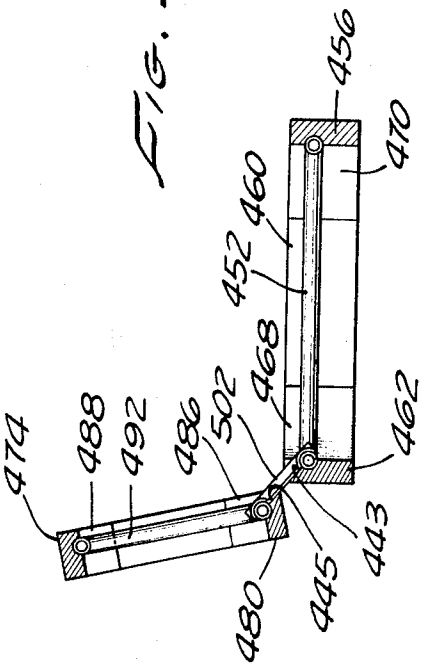


FIG. 17.

FIG. 18.



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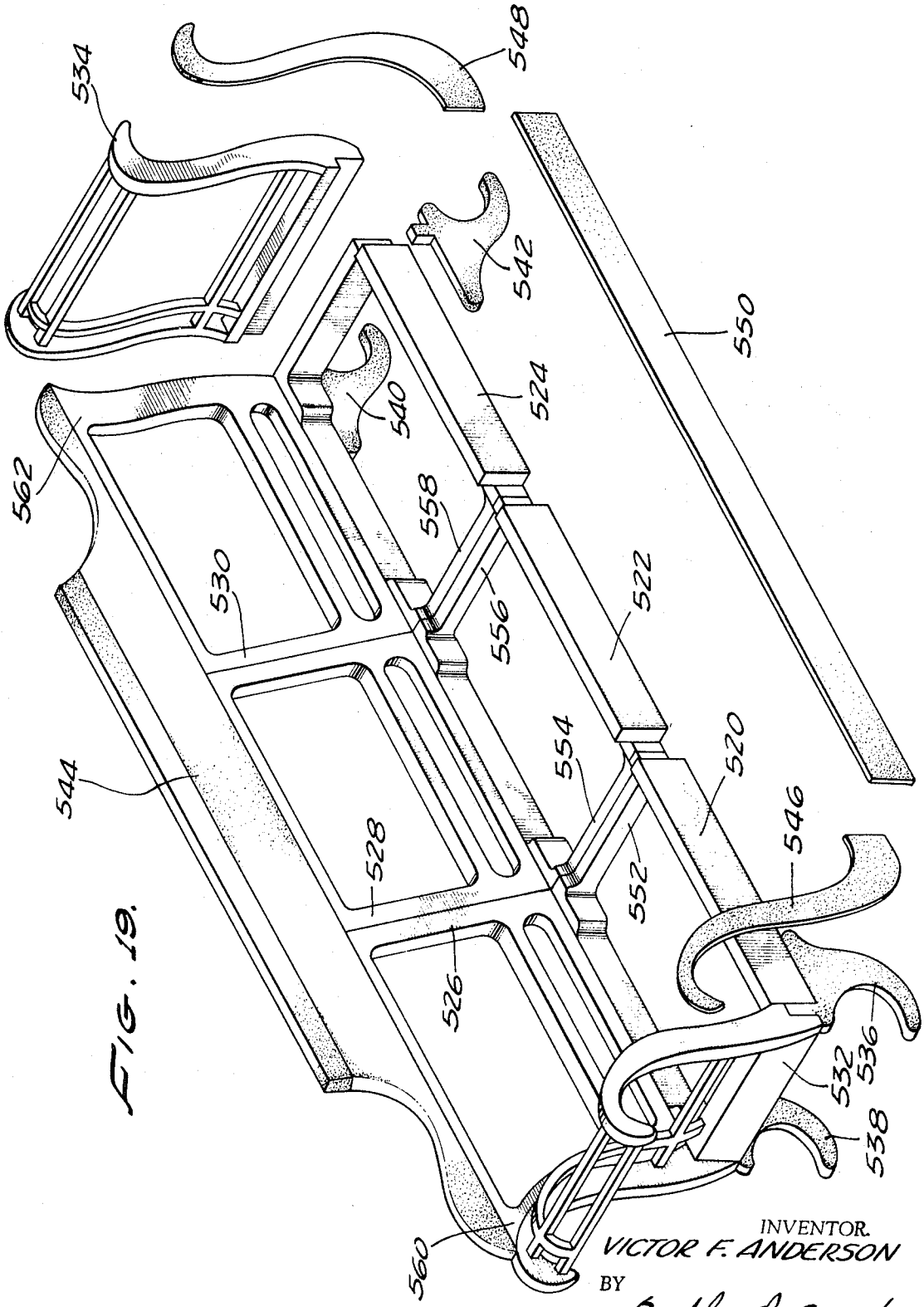


FIG. 19.

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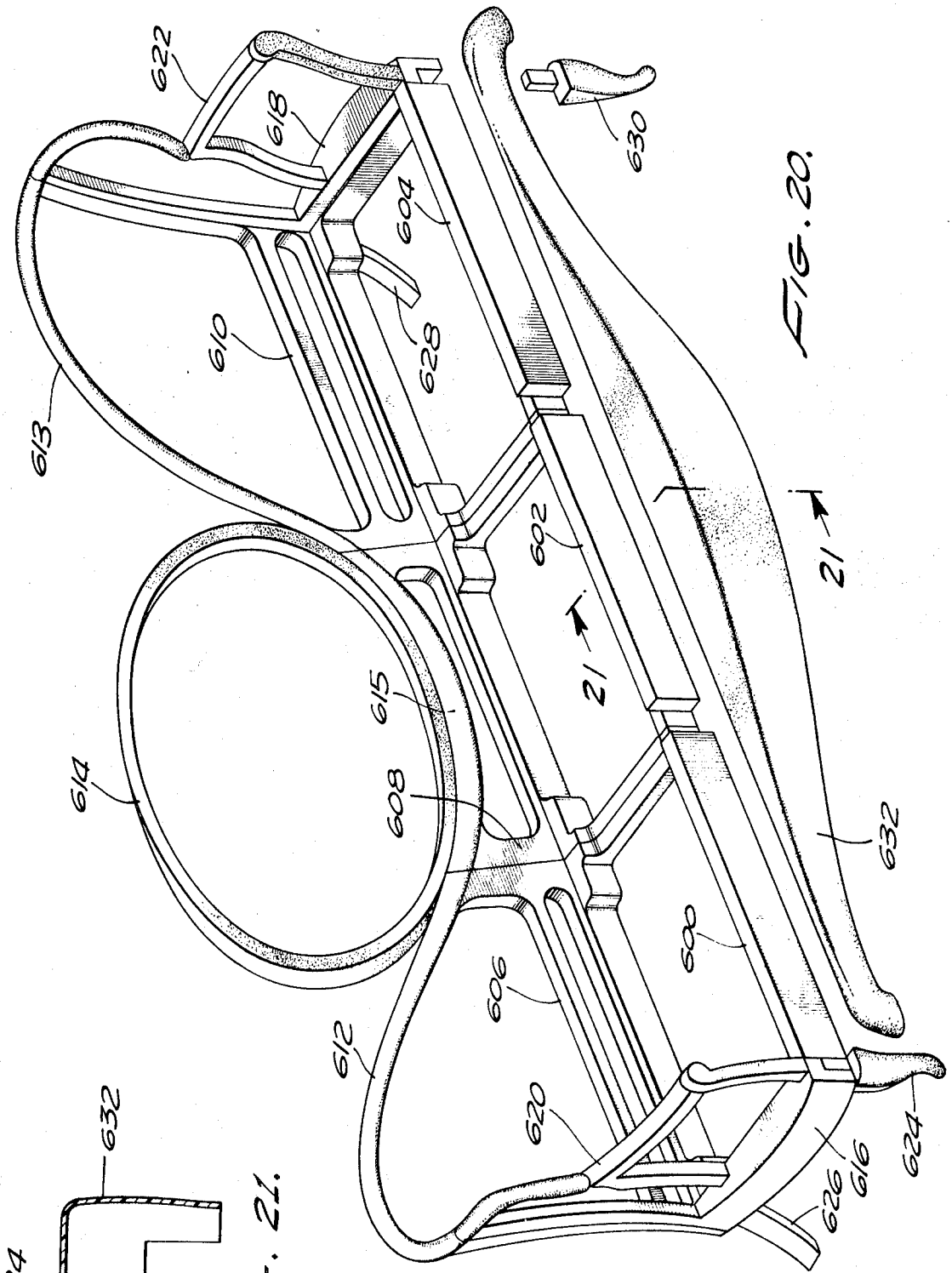


FIG. 20.

FIG. 21.

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MODULE FRAMES FOR STANDARDIZED UPHOLSTERY TYPE FURNITURE AND METHOD OF CONSTRUCTING AND ASSEMBLING SAME

CROSS REFERENCES TO RELATED APPLICATIONS

1. Ser. No. 797,616, titled Bipartite Tubular Molded Plastic Furniture Part with Integral Reinforcement; filed 2-7-1969 now abandoned
2. Ser. No. 815,119, titled Modular Furniture Embodying a Common Chassis and Interchangeable Styling Features; filed **4-10-1969**, now U.S. Pat. No. 3606510.
3. Ser. No. **816,711**, titled Furniture Joint; filed 4-16-1969, now U.S. Pat. No. 3,583,733
4. Ser. No. 816,699, titled Cushion Assembly for Chairs and Other Furniture; filed 4-16-1969, now U.S. Pat. No. 3,556,594 and
5. Ser. No. 865,043, titled Plastic Furniture Structure with Internal Reinforcing Case filed 10-19-1969, now U.S. Pat. No. 3,639,001.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to furniture and more particularly to a novel module frame structure for sitting type furniture such as chairs, sofas, couches, davenports, settees and the like.

2. Description of the Prior Art

There is an ever increasing demand for furniture particularly of the sitting type such as upholstered chairs and sofas in the many and varied styles ranging from the most simple, modern styles to the most ornate, provincial styles. Furniture of this sort is commonly fabricated from a number of separate pieces of wood which are individually shaped by machine and then glued, screwed, or the like, together during which time the assembled pieces are held in a fixed relationship with the aid of jigs or clamps. This method of fabrication is quite laborous and lends itself to only limited mass production techniques.

In addition, the greatly increased cost of lumber, the slowness of curing, the poor quality in cutting of lumber, the excessive waste in forming other than straight shapes, and the very limited supply of fine, hard wood pieces have resulted in poor quality furniture chassis. As a consequence of the lack of good natural material, and therefore the substitution of poor quality material, the inherent waste of wood and poor mass production type joints and joining techniques present day furniture is unacceptably weak and subject to premature structural failures.

As a general rule the major parts or chassis of a chair or a sofa of various styles are not interchangeable in the sense that the same parts cannot be used in a variety of different furniture styles. The advantage of such interchangeability, of course, would be a substantial cost savings as pointed out in my above-mentioned co-pending applications. In one of my recently issued U.S. Pat. No. 3,455,605, titled Prefabricated Plastic Chair and Assembly Method, the advantages of prefabricated parts which may be made of a formable synthetic resin was disclosed. Nevertheless, further improvement is of course always desirable and is provided by the present invention.

SUMMARY OF THE INVENTION

The present invention provides a standardized frame assembly for sitting type furniture comprising in combination a standardized seat frame including means for connecting said seat frame and a set of arms, a set of legs and a set of side panels; a back frame adapted to be connected to said seat frame; and means for connecting said back frame and said seat frame.

In addition, the present invention includes a method of assembling an article of sitting type furniture, having a standardized frame assembly comprising the steps of providing a standardized seat frame having means for connecting said seat frame and a set of arms, a set of legs and a set of side panels, said connecting means comprising a plurality of projections and slots; providing a back frame; providing means for connecting said back frame and said seat frame; providing a set of arms integral with said set of side panels, said side panels having a plurality of projections and slots corresponding to said seat frame connecting means for connecting said side panels and said seat frame; providing a set of legs, each leg having projections corresponding to said seat frame connecting means for connecting said leg and said seat frame; attaching said seat frame and said back frame; attaching said side panels and said seat frame; by engaging corresponding projections and slots; attaching said set of legs and said seat frame; by engaging said leg projections and corresponding slots; providing upholstery; and connecting said upholstery to said seat frame and said back frame.

An object of the present invention is to provide a standardized module frame for sitting type furniture.

Another object of the present invention is to provide a frame structure which will allow economical assembly line production of sitting type furniture.

Still another object of the present invention is to provide a standardized frame for furniture to which other elements or furniture pieces can be added where the other elements and the frame have standardized connectors to enable the standardized frame to be used as a foundation to produce any style of furniture desired.

Another object of the present invention is to provide a standardized frame which can be fastened to other standardized frames to produce a standardized frame structure for multiple sitting type furniture such as a sofa, couch or the like.

A further object of the present invention is to provide a standardized frame for sitting type furniture to achieve economical manufacture of a multitude of various furniture styles, all using the standardized frame.

Yet another object of the present invention is to provide a standardized frame for sitting type furniture which can be easily and quickly assembled with relatively unskilled labor to provide a simple but sturdy structure for upholstered furniture.

A further object of the present invention is to provide a standardized frame having a constructural configuration providing great strength with a minimum amount of material.

A still further object of the present invention is to provide a standardized frame having unique joint configurations allowing unique joining techniques for producing greater structural integrity, ease of production, and greater flexibility in styling.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partially exploded perspective view of a sofa illustrating a standardized frame and stylized accessories.

FIG. 2 is an exploded partially broken away perspective view of a standardized seat frame and back frame module with chair type stylized accessories.

FIG. 3 is a partial plan sectional view taken along line 3—3 of FIG. 2, illustrating the back frame, the left rear portion of the seat frame, the left rear portion of the side panel and a rear leg.

FIG. 4 is a partial plan sectional view taken along line 4—4 of FIG. 2, illustrating the left front portion of the seat frame, the left front portion of the side panel and a front leg.

FIG. 5 is a partial plan sectional view taken along line 5—5 of FIG. 1.

FIG. 6 is a partial plan sectional view taken along line 6—6 of FIG. 1.

FIG. 7 is a partially exploded perspective view of an ornate chair using the standardized frame shown in FIG. 2.

FIG. 8 is a partially exploded side view of an ornate variation of a sofa or chair similar to those shown in FIGS. 1 and 7.

FIG. 9 is a partially exploded, partially broken away, perspective view of another embodiment of a standardized frame.

FIG. 10 is a partially broken away, exploded perspective view of the portion of the embodiment shown in FIG. 9 enclosed within the circle 10—10.

FIG. 11 is a plan view of a standardized frame for a sofa using a frame structure similar to that shown in FIG. 9.

FIG. 12 is a sectional view taken along line 12—12 of FIG. 11.

FIG. 13 is an exploded perspective sectional view of an embodiment of a standardized frame structure.

FIG. 14 is an exploded perspective sectional view of another embodiment of a standardized frame structure.

FIG. 15 is an exploded perspective sectional view of still another embodiment of a standardized frame structure.

FIG. 16 is a partially exploded perspective view of another embodiment of a standardized frame.

FIG. 17 is a plan view of a standardized frame for a sofa embodying a standardized frame similar to that shown in FIG. 16.

FIG. 18 is a sectional view taken along line 18—18 of FIG. 17.

FIG. 19 is a partially exploded perspective view of a sofa illustrating another embodiment of a standardized frame and stylized accessories.

FIG. 20 is a partially exploded perspective view of a sofa illustrating another embodiment of a standardized frame and stylized accessories.

FIG. 21 is an elevational sectional view taken along line 21—21 of FIG. 20.

DESCRIPTION OF THE EMBODIMENTS

Referring to FIG. 1, the inventive concept is introduced in a generalized form by illustrating a frame assembly 10 for a sofa of a size suitable to seat three people. The frame assembly 10 comprises three connected standardized seat frames 12, 14 and 16, each connected to one of three back frames 18, 19 and 20, respectively. In addition, shown connected to the frame assembly 10 in a partially exploded illustration are a set of four legs, 22, 24, 26 and 28 and a set of ornamental side panels 30 and 32. An ornate top molding 40 is shown which will attach to the back frames 18, 19 and 20, while a front molding 46 having a finished surface is in an exploded position to be received across the front portion of the seat frames 12, 14 and 16, just above the two legs 24 and 28. As shown, the sofa is comprised of three frame modules which have been connected to form a preselected chassis length for the sofa. As will be explained hereinbelow in more detail the frame modules may be used individually as a chair chassis or in multiple arrangements as various length sofas.

In its finished condition the sofa of FIG. 1 will have upholstery extending across the back frames 18, 19 and 20 and on both the inner and outer sides of the side panels 30 and 32. In some cases, coil springs (not shown) would be located within the seat frames 12, 14 and 16 which would then be covered by appropriate webbing and upholstered cushions (not shown). Since the top molding 40 and the front molding 46 are of a decorative nature they would not be covered with upholstery.

Referring to FIG. 2, there is shown in more detail a seat frame 60, which is identical to the seat frame 12 of FIG. 1, and a back frame 62, which is identical to the back frames 18, 19 and 20 shown in FIG. 1. The seat frame 60 is an easily, quickly, inexpensively and reproducibly manufactured element and may be formed of any suitable synthetic resin as an integral element. The seat frame 60 comprises four generally distinguishable portions, side portions 64 and 66, which are parallel and oppositely disposed from one another and front portion 68 and rear portion 70. It is to be noted that the terms "front" and "rear" are used as they are normally used to describe a chair where the front of the chair is generally considered to be that portion which supports the legs of one who is sitting on the chair and the rear is that portion to which a seat back is attached to support the upper torso of the one who is seated upon the chair.

The front portion 68 is an elongated, generally rectangular shaped element having a "U" shaped cross-section which may be conveniently reinforced by a number of spaced ribs 72, as illustrated in the broken-away region. The side portions 64 and 66 are also generally rectangular in shape and may also have a generally U-shaped cross section with spaced ribs (not shown) similar to the front portion 68.

The rear portion 70 is comprised of a thin central section 74, having external strengthening trusses 76. The central section 74 widens outwardly into two end sections 78 and 80, which are structured in a manner similar to the front portion 68, and the side portions 64 and 66, that is, having a "U" shaped cross section and reinforcing ribs.

The seat frame 60 has means for connecting itself to the back frame 62, to a set of legs such as legs 82, 84, 86 and 88, to a set of side panels such as side panels 90 and 92, and to a set of arms which may be integral with the side panels 90 and 92, such as a portion of arm 93 which is integral with the side panel 92. The connecting means comprises a plurality of projections and a plurality of complementing slots which receive the projections. For example, leg 84 has two projections 94 and 96; the projection 94 is received by a complementing slot 98 within the side portion 64 while the projection 96 is received by a complementing slot 100 within the front portion 68. The sectional view, shown in FIG. 4, illustrates the position of the leg 84 when it is in an engagement with the seat frame 60. In an analogous manner, leg 82 has two projections 102 and 104. The projection 102 is received within a complementing slot 106 within the side portion 64, while the projection 104 is received within an opening 108 in the back frame 62, as more clearly shown in FIG. 3 where the leg 82, the back frame 62 and the seat frame 60 are shown in engagement. Leg 86 is engageable with the seat frame 60 in a manner analogous to leg 84, while leg 88 is engageable with the seat frame 60 and the back frame 62 in a manner analogous to leg 82.

The front portion 68 of the frame module 60 has a height in excess of the side portions 64 and 66 to accommodate the side panels 90 and 92. The upper parts of the side portions receive the side panels to form a cavity of equal height including the front portion. This cavity receives the cushioning construction material.

Referring to FIG. 4, there is illustrated the connecting means for engaging the side panel 90 with the side portion 64. The side portion 64 has connecting means including a projection 110 which has a dovetail sectional shape and a slot 112 spaced a slight distance from the projection 110 and also having a dovetail sectional shape. Corresponding to the projection 110 and the slot 112, are respectively, slot 114, and projection 116 of the side panel 90. While FIG. 4 illustrates the connecting means for the side panel 90 and the side portion 64, adjacent to the front portion 68, FIG. 3 illustrates the connecting means for the side panel 90 and the side portion 64, adjacent to the rear portion 70. In FIG. 3, a projection 118 of the side panel is engageable with a corresponding and complementing slot 120 of the side portion and a dovetail projection 122 of the side portion is engageable with a slot 124 of the side panel.

The back frame 62 and the seat frame 60 are also engageable by having dovetail projections 126 and 128, FIG. 2 engage corresponding and complementing slots 130 and 132 within, respectively, the end sections 78 and 80 of the rear portion 70. To complete the FIG. 2 embodiment, a top molding 140 is engageable with the back frame 62, using a convenient projection 142 and slot 144 arrangement. The top molding 140 is analogous to the top molding 40 in the FIG. 1 embodiment, and may be shaped in any desired fashion to help achieve the styling characteristic of the chair of which it is a part.

As can now be readily appreciated, when all of the elements, such as the seat frame 60, the back frame 62, the legs 82, 84, 86, and 88, and the side panels 90 and 92 are made of a formable synthetic resin, all of which have corresponding and complementing projections and slots, assembly of the frame module and accessories can be achieved quickly and economi-

cally on an assembly line basis. Other decorative elements which make up a complete chair or sofa having a distinctive styling characteristic can also be added quickly and economically. Thus there is no need for jigs or fixtures which are required in present day construction of furniture.

The completely assembled frame will not only be less expensive than present day wood frames, but will be far superior in structural intiquity. A synthetic resin can be molded to form equal wall thicknesses and have an evenness in quality of material throughout an element; when this is coupled with the uniquely structured joints and joining techniques a superior product is achieved.

A preferable synthetic resin material for the frame module and accessories is a high heat, high impact polystyrene, such as manufactured by the Shell Chemical Company of Marietta, Ohio. To achieve a permanent and exceedingly strong bond between the various elements mentioned, various techniques and/or materials can be used, for example, adhesives, press fits, solvents, ultrasonic welding, and inert gas welding. It is to be understood that other synthetic resins may be used, for example, melamine, phenolics, polyesters, polyolefins, urethane (flexible foam and rigid foam), vinyl and the like. Additionally, it is to be understood that other structural material outside the plastics and resins field may be used, such as precut wood, compressed wood, filled epoxy, corrugated paper, or even metal; of course, a mixture of the various materials could be used, such as a metal and polystyrene, if found desirable. It is also to be understood that the present invention is not to be limited by the materials mentioned, since there are a great many materials presently available which may be used, and it is assumed a great many more materials will appear on the market in the future, all of which may be used to practice the teachings disclosed herein.

Referring to FIG. **5**, a portion of the FIG. **1** embodiment is shown where side panel **30** and the leg **24** are in engagement with the seat frame **12**. As already discussed for the FIG. **2** embodiment, the side panel **30** and the seat frame have connecting means including a projection **150**, which is engaged with a complementing slot **152** in the seat frame **12**, and the projection **154** of the seat frame which is in engagement with the complementing slot **156** of the side panel. Two projections **158** and **160** of the leg **24** are engaged respectively in the complementing slots **162** and **164** of the seat frame.

Referring now to FIG. **6**, the front portion of the standardized seat frames **12** and **14** FIG. **1**, are shown in engagement. Once again, the connecting means, comprising projections and complementing slots are used to allow quick and economical assembly. Seat frame **12** includes a projection **170** which is engaged with complementing slot **172** of seat frame **14** while a projection **174** of seat frame **14** is engaged with complementing slot **176** of seat frame **12**. A similar connection arrangement exists between the seat frames **12** and **14**, at their rear regions, and a similar connection arrangement exists between the seat frames **14** and **16**, so that the sofa of FIG. **1** is achieved. It is, of course, understood that the seat frames can be multiplied to accommodate any number of seating positions without departure from what has already been disclosed, except for the possibility of intermediate legs (not shown) to support the expected increased load and prevent frame deflection. Additionally, since each seat frame is interchangeable with any other seat frame, there is no special sequential order required.

Springs may be added to the seat frames of the sofa of the FIG. **1** embodiment or to the seat frame of the chair embodiment of FIG. **2** by attaching an interlace of burlap webbing to the bottom of the seat frame, sewing a predetermined number of coil springs to the webbing, interlacing the springs with cord in a first direction so that the cord is attached to the side portion **64** and **66** and then interlacing the springs with cord in a perpendicular direction so that the cord is connected to the front portion and rear portion of the seat frame. Then webbing is placed on top of the springs and tacked to the side portion, front and rear portions, and the webbing is then sewn to the top of the coil springs. Next, cushion material is placed in appropriate locations; a cloth covering is added and finally upholstery attached.

Referring back to FIG. **2**, it is noted that the side panels **90** and **92** have a rib like construction so as to achieve the efficiency and the strength of equal wall thicknesses throughout the structure. For example, each of the side panels has a base plate, such as base plate **91** of side panel **92** to which is integrally molded a plurality of vertical ribs, such as rib **95** of the side panel **90**. The various rib type structures are disclosed in my co-pending applications (2) Ser. No. 815,119, and (5) Ser. No. 865,043. Another unique advantage achieved by the particular design shown for the side panels **90** and **92** as well as the design of the projections and slots of the back frame **62** and the seat frame **60** is that they may be produced with a two piece mold. Each part is molded without any undesirable undercuts. Yet the final joints have excellent interference characteristics to allow quick and easy assembly without the usual jigs or fixtures and additionally are uniquely suited for such joining techniques as solvent, ultrasonic, or inert gas welding or adhesive bonding, for example.

Referring now to FIG. **7**, there is illustrated the full frame structure of an upholstered chair (without the upholstery being shown). The chair comprises a seat frame **180**, which is identical to the seat frame **60** of FIG. **2**, a back frame **182**, which is identical to the back frame **62** of FIG. **2**, a side panel **188** having an arm **189** which is analogous to the side panel **90** of FIG. **2**, a side panel **190** and arm **191** which is analogous to the side panel **92** of FIG. **2**, legs **192**, **194**, **196**, and **198**, which are analogous to the legs **82**, **84**, **86**, and **88** of FIG. **2**, and a top molding **200** which is analogous to the top molding **140** of FIG. **2**. In a comparison of the embodiments shown in FIG. **1** and FIG. **7**, it is noted that while the module comprising the standardized seat frame and back frame are identical, the legs, the top molding, and the side panels are different, to yield a piece of furniture having a different styling characteristic. However, the side panels, the legs, and the top molding are interchangeably connected to the module frame with other accessory pieces; this again emphasizes the economical structure being disclosed.

It is, of course, to be understood that the frame and accessory pieces all have generally U-shaped cross sections with reinforcing ribs or trusses. As in the FIGS. **1** and **2** embodiments, the elements of FIG. **7** have equal wall thicknesses to enhance the strength of the various elements.

Referring to FIG. **8**, still another variation of furniture design is shown. The pieces or elements are engageable to a module frame comprising a seat frame **202** and a back frame **204**. In the exploded view of FIG. **8**, two decorative legs **206** and **208** are illustrated, each having the type of connecting means (not shown) described for the FIG. **2** embodiment. A side panel **210** and a nonintegral arm **212** are illustrated where the arm **212** carries out the particular styling characteristic.

In addition to the styling function, the arm **212** has a border tacking surface **213** to allow placement of upholstery along the sides of the furniture piece. The side panel **210** has two elongated openings **209** and **211**; elongated opening **209** is in a horizontal position and elongated opening **211** is in a generally vertical position, which allow upholstery to be pulled through when upholstering the inside portions of the seat, back and side panels. Referring back to FIGS. **2** and **7**, elongated openings **215**, FIG. **2** and **216**, FIG. **7** are provided for drawing back fabric during upholstering. Returning to FIG. **8**, a top molding **214** is also illustrated, engageable with the back frame **204**. The side panel **210** attaches to the seat frame **202** and the back frame **204** while the arm **212** becomes attached to the side panel **210**. The panel **210** and the spacing between the side panel and the arm on both sides of the arm will be upholstered in the final furniture form.

Referring now to FIGS. **13**, **14**, and **15**, there are illustrated three different embodiments of the sectional shape which a back frame or seat frame structure, such as seat frame **60** and back frame **62**, FIG. **2**, may take. For example, front portion

68 of the seat frame 60 may have a cross section, as illustrated in FIG. 13, which is generally U-shaped having a base portion 330 and two leg portions 332 and 334. The leg portion 332 has a laterally extending peg 336, which cooperates with an opening 338 in a tacking panel 340 to properly locate the tacking panel 340 adjacent the leg 332. A tacking panel provides a convenient surface to which upholstery may be attached, such as by stapling, tacking, adhering, using press fit inserts, and the like. The press fit insert concept is disclosed in my co-pending applications (4), Ser. No. 816,699. The structure of FIG. 14 is generally H-shaped having two main members 342 and 344 and a lateral cross member 346. Tacking panels, such as panels 350 and 352, may be secured to the H-shaped member in any convenient fashion, such as by wedging the tacking panel 350 between the members 342 and 344 on one side of the member 346 and wedging the other panel 352 between the members 342 and 344 on the opposite side of member 346.

The structure of FIG. 15 is also generally H-shaped, comprising two parallel wall members 360 and 362 and a lateral member 364 and having a lateral extension 366, extending away from the wall 360. The lateral extension 366 has channel shaped grooves 368 and 370 located within its extending surfaces which are adapted to position, respectively, tacking panels 372 and 374.

Referring now to FIG. 19, there is illustrated another variation of a sofa chassis to illustrate the great versatility of the modular concept disclosed herein. The chassis comprises three connected seat frames 520, 522, and 524, three back frames 526, 528, and 530, two side panels 532 and 534, a set of ornamental legs 536, 538, 540, and 542, an ornamental top molding 544, two panel ornamental moldings 546 and 548, and an ornamental front molding piece 550. The seat frames 520, 522, and 524 are identical with several exceptions to the seat frame 60 of FIG. 2. The exceptions are that in order to accommodate appropriate springs, webbing and the like, side portion 552 of the seat frame 520, side portions 554 and 556 of seat frame 522, and side portion 558 of seat frame 524 are all of a reduced cross section when compared to these side portions discussed relating to FIG. 2. The reduced cross sections would be constructed in the same manner as described for the side portions in FIG. 2; that is, they would be generally U-shaped and have laterally spaced reinforcing ribs. When the seat frames are molded, achieving a reduced cross-sectioned side portion is accomplished by simply locating an insert in the appropriate position in the mold that is used to fabricate the seat frame of FIG. 2. Hence, if a sofa is to be cushioned with Marshall springs, reduced cross-sectioned side portions are formed; if the sofa is to be cushioned with zigzag springs or other type of resilient cushioning material, full cross-sectioned side portions are formed.

Another variation illustrated in FIG. 19 is that of the back frames 526 and 530. It is noted that the back frame 528 is identical to the back frame 62 of FIG. 2 and is connected to the corresponding seat frame 522 in the already described manner. However, to achieve a particular furniture styling effect the end back frames 526 and 530 have outer lateral edges 560 and 562, respectively, fashioned in a slightly modified manner. Connections to the respective seat frames 520 and 524 are made in the same manner as the standard back frame.

The side panels 532 and 534 extend to about the same height as the back frames, and therefore would not function as arms if arms are defined as those parts of a sofa or chair which may function as a support an arm of one who is sitting upon the sofa or chair. With the design shown, it is contemplated that the entire length both inside and outside of the side panels will be upholstered in the finished furniture piece with the side panel moldings 546 and 548 being applied to the front facing surfaces of the side panels 532 and 534. In a like manner, the front molding 550 is applied to the front portion of the seat frames in order to achieve the desired styling effect. The set of legs has also been uniquely styled to achieve the desired styling characteristic. However, although the styling of the sofa, FIG. 19, is different from the styling of the sofa of FIG. 1 and the styles illustrated in FIGS. 7 and 8, the modular concept allows the accessory pieces to be interchangeable since all have the same types of connecting means in the identical locations. It is understood that in some styles of furniture, it may be necessary to dispense with a standard back frame and have only specially designed back frames so that the basic module consists of just a seat frame. However, even with an especially styled back frame, the means of connecting the back frame to the standard seat frame would nevertheless remain standardized so that economy of assembly is retained.

Referring now to FIG. 20, there is illustrated a sofa with an especially styled back frame. The sofa comprises three seat frames 600, 602, and 604, which are identical to the seat frames of the sofa of FIG. 19. The FIG. 20 sofa comprises three nonstandard back frames 606, 608, and 610, which are specially formed for the particular style characteristic shown. Thus, the module frame for a FIG. 20 sofa comprises only the seat frame, while the back frames are of a nonstandard design. However, it is to be noted that although the back frames have a nonstandard design, they are still standardized in the sense of the projection-slot arrangement which allows their connection to a standard seat frame. Therefore, no economy is given up regarding the quickness and ease of assembly. Back frame 606 includes top molding 612; back frame 610 includes top molding 613; and back frame 608 includes top molding 615 and an elliptically shaped molding 614. The sofa additionally includes two side panels 616 and 618 which include integral arms 620 and 622, respectively. As with the FIG. 19 sofa, the FIG. 20 sofa includes a set of four stylized legs 624, 626, 628, and 630 which are fastened in the already described manner. A special front molding 632 is shown which is slightly bowed so that a portion of the molding opposite the seat frame 602 is spaced at a greater distance than those portions of the front molding which are adjacent the seat frames 600 and 604.

Referring now to FIG. 21, there is illustrated the location 634 along which the molding 632 is attached to the front portions of the seat frames 600, 602, and 604. As already mentioned any one of a number of attachment techniques can be used from traditional mechanical fasteners to various bonding techniques to various welding techniques.

Another major embodiment of a standardized frame assembly is shown in FIG. 9, and comprises a standardized seat frame 220 having four elongated elements, a front element 222, two side elements 224 and 226, and a rear element 228. Each of the elongated elements have attachment projections at each end of the element as is shown in FIG. 10, where the front element 222 is illustrated having a projection 230 of slightly reduced thickness than the remainder of the element 222, and having a transverse recess 232. Additionally, the seat frame 220 comprises four corner mounts, corner mount 234 connecting elongated elements 222 and 224, corner mount 236 connecting elongated elements 224 and 228, corner mount 238 connecting elongated elements 228 and 226, and corner mount 240 connecting elongated elements 222 and 226. Again referring to FIG. 10, the corner mount 234 is shown in greater detail and includes a slot 242 which complements the projection 230. A lateral ridge 244 extends along the slot 242 and is engageable with the lateral recess 232 of the projection 230. The corner mount 234 includes a bottom spacer 235 which provides a convenient abutment for the elongated element which connect to the corner mount. For example, elongated element 224 is shown connected to the corner mount 234. To achieve the connection the elongated element is held at a position above the corner mount and is then engaged to the corner mount by having the projection of the elongated element slide downwardly into the slot of the corner mount. The spacer 235 of the corner mount will correctly position the vertical location of the elongated element while the ridge-slot arrangement of the corner mount and elongated element, respectively, retain the elongated element against horizontal movements. The advantages of the projection-slot arrangement mentioned for the FIG. 2 embodiment apply with equal validity to the FIG. 9 embodiment in that as-

sembly of the frame module can be accomplished quickly and economically.

The corner mounts also include slots, such as slots **250** and **252** of corner mount **234**, which are in a position to receive the projections from a leg as discussed above with regard to the FIG. **2** embodiment. A leg **254** is illustrated in FIG. **9** having two projections, **256** and **258**, which are mateable with the slots of the corner mount **240** (not shown, though they are identical with slots **250** and **252**).

It has been mentioned that the elongated elements slide into engagement with the corner mount by moving in a downward direction; the legs, however, are mounted to the corner mount in just the opposite fashion by having the leg projection slide into the slots of the corner mount in an upward direction. The upward sliding movement of the leg, relative the corner mount, is limited by an internal rib or spacer, such as spacer **237** of corner mount **234**. The unique feature of the assembly method of the elongated elements and the legs with the corner mounts is that in normal usage the usual load in a downward direction on the elongated elements is counteracted by the opposite and equal force transmitted through the legs in an upward direction so that under normal loading connection of the furniture piece is actually aided. This is conducive to maintaining the furniture assembly rather than causing its separation. In addition, the corner mounts contain four openings placed in pairs, such as the pair of openings **239** and the pair of openings **241** of the corner mount **234**, FIG. **10**. These openings are to receive projections from side panels (not shown). The spacer, such as spacer **237** which acts to limit the upward sliding motion of the leg, also performs the function of a bottom surface or floor for the openings **239** to limit the sliding downward motion of the side panel. Additional internal ribbing **243** is provided in the corner mount **234**, FIGS. **9** and **10**.

The standardized frame also includes a back frame **260** which is comprised of four elongated elements, a top element **262**, two side elements **264** and **266**, and a bottom element **268**. Additionally, four corner mounts are illustrated, corner mount **270** connecting elongated elements **262** and **264**, corner mount **272** connecting elongated elements **262** and **266**, corner mount **274** connecting elongated elements **266** and **268**, and corner mount **276** connecting elongated elements **268** and **264**. Each of the elongated elements **262**, **264**, **266**, and **268** are constructed with projections as discussed for the element **222** and connect to their corresponding corner mounts and in a manner identical to that discussed for corner mount **234**. Each of the corner mounts **270**, **272**, **274**, and **276** are constructed identical to corner mount **234**, however, the slots and openings to receive the legs and side panels respectively serve no function and could be eliminated if desired. Attachment between the back frame **260** and the seat frame **220** is made by a connector **278** which may be an integral member having a channel **280** to receive the elongated element **268** of the back frame **260**, strengthening members **282** and an L-shaped arm **284** which cooperates with the strengthening member **282** to attach to the elongated member **228** of the seat frame **220**.

Referring to FIGS. **11** and **12**, a sofa frame is illustrated using a variation of a standardized frame assembly shown in FIG. **9**. When acting as a sofa frame, the standardized seat frame comprises an elongated front element **300**, two side elements **302** and **304** and a rear elongated element **306**. Four corner mounts **301**, **303**, **305**, and **307** are provided, each connecting two elements as was disclosed for the FIG. **9** embodiment. In addition, ribs **308** and **310** are used between the front elongated element **300** and the rear elongated element **306** for structural support. In a like fashion, the back frame may be comprised of a top elongated element **312**, a bottom elongated element **314**, and two side elongated elements which are not shown but which would be equivalent to the elongated elements **264** and **266** of FIG. **9**. Four corner mounts (only two of which are shown, **311** and **313** in FIG. **12**) are provided and function analogous to the corner mounts **270**, **272**, **274**, and **276** of the back frame **260**, FIG. **9**.

Strengthening ribs (not shown) may be used intermediate the side elongated elements to offer support for the back frames. To connect the back frame to the seat frame three connectors **316**, **318**, and **320** are illustrated and are structured and function analogously to the connector **278** of FIG. **9**. While a modification has been made to the FIG. **9** module frame to achieve the sofa frame shown in FIGS. **11** and **12**, the same frame shown in FIG. **9** could be used for a sofa simply by connecting a number of module frames together using any convenient fastener such as nails, screws, bolts or the like or using an adhesive or welding technique, or using a projection-slot arrangement.

As mentioned above for FIGS. **1** and **2** embodiments, the FIGS. **9** and **11** embodiments may be made of any suitable material, such as wood, corrugated paper, solid plastic, solid foam plastic or sheet metal, to name just a few. Additionally, the connection between the various parts can be achieved by any convenient means, such as various forms of welding, riveting, or if desired, the conventional methods of gluing and/or attachments with screws. The cross section of the elongated elements may be solid or hollow, depending upon the material used, and if hollow, may have reinforcing ribs if each of the elongated elements are formed from two individual parts in a manner analogous to that described in my co-pending application, (1) Ser. No. 797,616, or the elongated elements could be extruded so that either no reinforcing is necessary or desired. Metal rods may also be used.

Referring now to FIG. **16**, there is illustrated still another embodiment of a module frame assembly comprising a seat frame **380** and a back frame **382**. The seat frame in turn is comprised of elongated metal tube **384**, which is formed into a one piece rectangular loop. The metal tube **384** acts as the major support structure and is given body to allow the placement of upholstery by the addition of a number of elongated elements, such as front element **386**, side elements **388** and **390** and rear element **392**. Each of these elements have an interior surface with a recess, such as recess **392** in the element **386**. The recess forms a holding cavity by extending beyond the distance equal to the radius of the tube. The purpose of the recess is to allow each of the elongated elements **386**, **388**, **390**, and **392** to be positioned about and partially enclose the metal tube **384**. Additionally, the seat frame **380** includes four corner triangular elements **394**, **396**, **398**, and **400**. Each triangular element has a recess in two of its surfaces, such as the recess **402** in the triangular element **396**. The triangular elements cooperate at the corners of the rectangular shaped metal tube **384** to attach to two of the elongated elements and to act as an anchoring block to position a set of legs. For example, leg **406** has a lateral extending threaded rod **408** which fits through holes in the metal tube **384** (similar to hole **395**) and block element **396** (similar to hole **399** in block element **398**) and is held in place by a nut **410** and washer **412** combination. The back frame **382** is similarly constructed of four elongated members **420**, **422**, **424**, and **426** which surround a rectangular shaped tubular metal element **428**. Four strengthening triangular corner blocks **430**, **432**, **434**, and **436** are provided to function in a manner analogous to the elements **394**, **396**, **398**, and **400** (except for anchoring a set of legs).

Corner blocks may be attached to the elongated members by any convenient means, such as by welding or by a suitable fastener. For example, as illustrated, the elongated members may have holes, such as hole **423** in the member **422**, for receiving a bolt **425** which passes through the hole **423**, another hole in the metal tube **428** similar to the hole **429**, and then through another hole in the corner block **432** similar to the hole **435** in the block **434**. The bolt **425** is held in place by a nut **427** and washer **431** combination. Another bolt **433** is similarly connected in a position disposed generally perpendicular to the bolt **425**.

The seat frame **380** and the back frame **382** are connected by a connector **440** which includes two longitudinal recesses **442** and **444** to allow engagement respectively with the metal tubes **384** and **428** by any convenient means, such as by weld-

ing, riveting, bolting, screwing, or the like. Appropriate cutouts, such as those designated **443** and **445** in elements **392** and **426** respectively, are provided to accommodate the connector **440** as is more clearly shown in FIG. **18**. Once again, the material of the frame can vary as already described in the previously mentioned embodiments and, as already mentioned for the FIG. **2** embodiment, the FIGS. **9** and **16** embodiment can be joined by one of many techniques, such as the various types of welding or adhering techniques.

Referring now to FIG. **17**, the frame embodiment of FIG. **16** is shown as it would be used in a sofa arrangement. The three rectangularly shaped metal loops **450**, **452**, and **454** are shown positioned in an abutting relationship surrounded by a front elongated member **456**, two side elongated members **458** and **460**, and a rear elongated member **462**. Additionally, four corner triangularly shaped block **464**, **466**, **468**, and **470** are shown and perform the same function as that described for the blocks **394**, **396**, **398**, and **400** of FIG. **16**. The sofa back frame is comprised of a top elongated member **474**, two parallel side elongated members **476** and **478**, a bottom elongated member **480**, and four triangular corner blocks **482**, **484** , **486**, and **488**. The main structural elements of the back frame are three aligned and abutting rectangularly shaped metal tubes **490**, **492**, and **494**. Connection between the back frame and the seat frame of the FIG. **17** embodiment is accomplished by three connectors **500**, **502**, and **504**, which are identically shaped to connector **440** of FIG. **16**.

Referring once again to FIG. **1**, the method of assembling the sofa is quite simple and quickly accomplished. The seat frames **12**, **14**, and **16** are connected together using the described projection-slot arrangement and then are attached to the back frames **18**, **19**, and **20**. Thereafter, the top molding **40** may be connected to the back frames **18**, **19**, and **20**. The legs **22**, **24**, **26**, and **28** are attached to the seat frames and are then followed by the attachment of the side panels **30** and **32**. Next, upholstery, including the necessary cushioning elements, is added and finally the accessories, such as molding element **46**, are added to complete the sofa. The three major embodiments illustrated in FIGS. **2**, **9**, and **16** all have in common distinct advantages over the prior art. For example, there is clearly an advantage in the ease in which furniture can be fabricated and assembled; secondly, there is a sharp drop in the amount of material scraped or wasted during fabrication; third, all of the elements of the various embodiments are molded or otherwise suitably formed to have equal wall thicknesses which produce exceptionally high strength and reduce the internal stresses to a minimum; fourth, the uniquely designed joints coupled with the joining techniques offer exceptionally high strength and durability; fifth, hollow synthetic resin parts have been found to have exceedingly high section modular strength and closely approximate the weight of a corresponding wooden part and tend to resist warping. It is important to note that what has been disclosed is a module frame comprising the back frame and the seat frame which can be used as the basic chassis for a large variety of furniture types; in addition, what has been disclosed is a method of fabrication, which, when combined with the unique structure of the module unit and the accessory pieces, provide an economical, though technically superior, piece of furniture than presently exists.

While a limited number of embodiments have been illustrated, the invention is not to be limited thereby. For example, the embodiments shown in FIGS. **2**, **9**, and **16** may have curved seat frames and back frames so as to achieve, when made into multiple seating furniture, a generally arcuate shape. Additionally, it is to be understood that the projections and complementing slots provide for quick and convenient alignment of elements and as temporary connecting devices which can then be reinforced by welding or conventional fasteners. Upholstering can be accomplished in much the same manner as is traditionally done with tacks, webbing, twine, staples, or metal and plastic bandings.

It is now apparent that the embodiments disclosed allow for the mass production of a variety of different styles and shapes of furniture. Additionally, the quality of the furniture is greatly increased, since the frame members may be constructed without the present structural deficiencies caused by the use of poor quality wood or wood laminates, both of which have inherent deficiencies and weaknesses. If a synthetic resin is used, deficiencies in wood, such as improper seasoning and excessive shrinkage, are completely eliminated.

I claim:

1. An article of sitting type furniture comprising:

a seat frame having side portions, a front portion, and a rear portion,

means for attaching front legs to the respective front corners of said seat frame;

a back frame having a width essentially equal to the length of said rear portion of said seat frame;

means for attaching the lower end of said back frame to the rear side of said rear portion of said seat frame, the lower corners of said back frame being cut out so as to provide corner spaces for rear legs immediately to the rear of the corners of said seat frame;

a pair of rear legs;

and means for fastening the upper end of each rear leg both to the rear vertical wall of the seat frame and to the vertical end wall of the lower end of said back frame while the upper end of each rear leg engages underneath the portion of said back frame which overhangs the respective corner cut-out.

2. An article of furniture as claimed in claim **1** wherein said fastening means includes lateral projections formed on the upper end of each rear leg and corresponding slots formed in both said seat frame and said back frame.

3. An article of furniture as claimed in claim **2** wherein all of said members are made of relatively rigid plastic material and are essentially hollow having thin exterior walls.

4. An article of furniture as claimed in claim **2** wherein the lower end of said back frame, and the rear wall of said rear portion of said seat frame, are provided with interengaging projections and slots for attaching said back frame to said seat frame.

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