Nov. 18, 1969 M. K. WALLACH ET AL 3,479,102

FURNITURE CONSTRUCTION

Filed Aug. 29, 1967 2 Sheets-Sheet 1

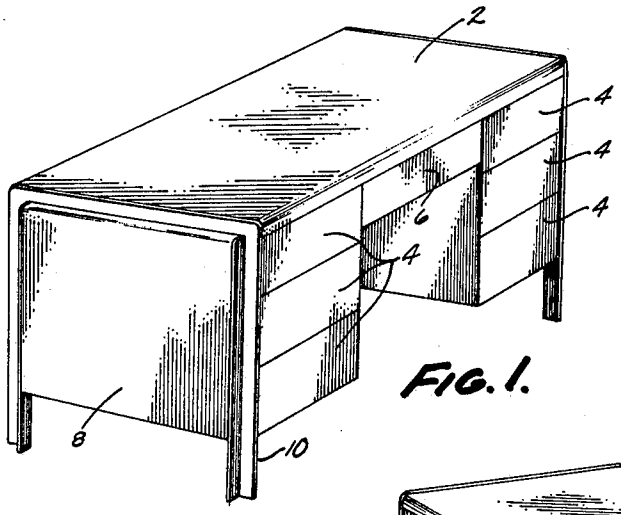

FIG. 1.

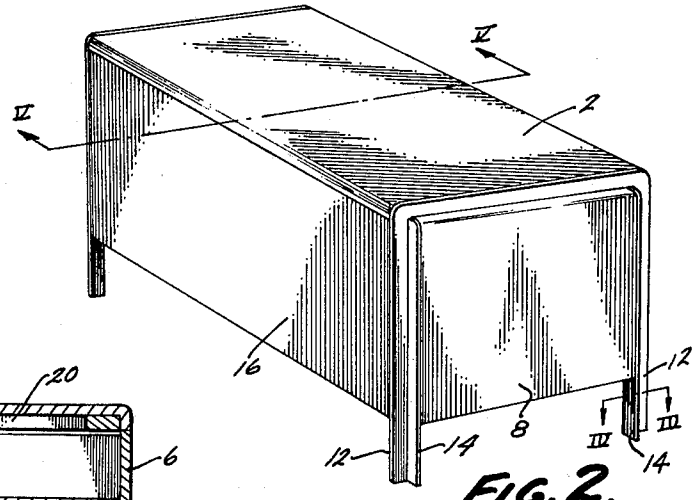

FIG. 2.

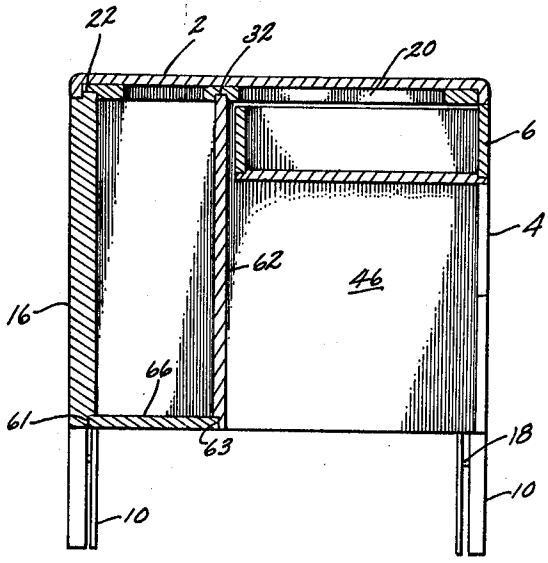

FIG. 5.

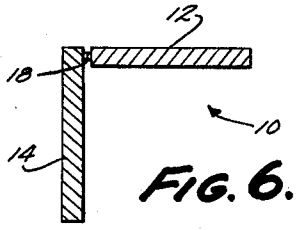

FIG. 6.

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Nov. 18, 1969 M. K. WALLACH ET AL 3,479,102

FURNITURE CONSTRUCTION

Filed Aug. 29, 1967 2 Sheets-Sheet 2

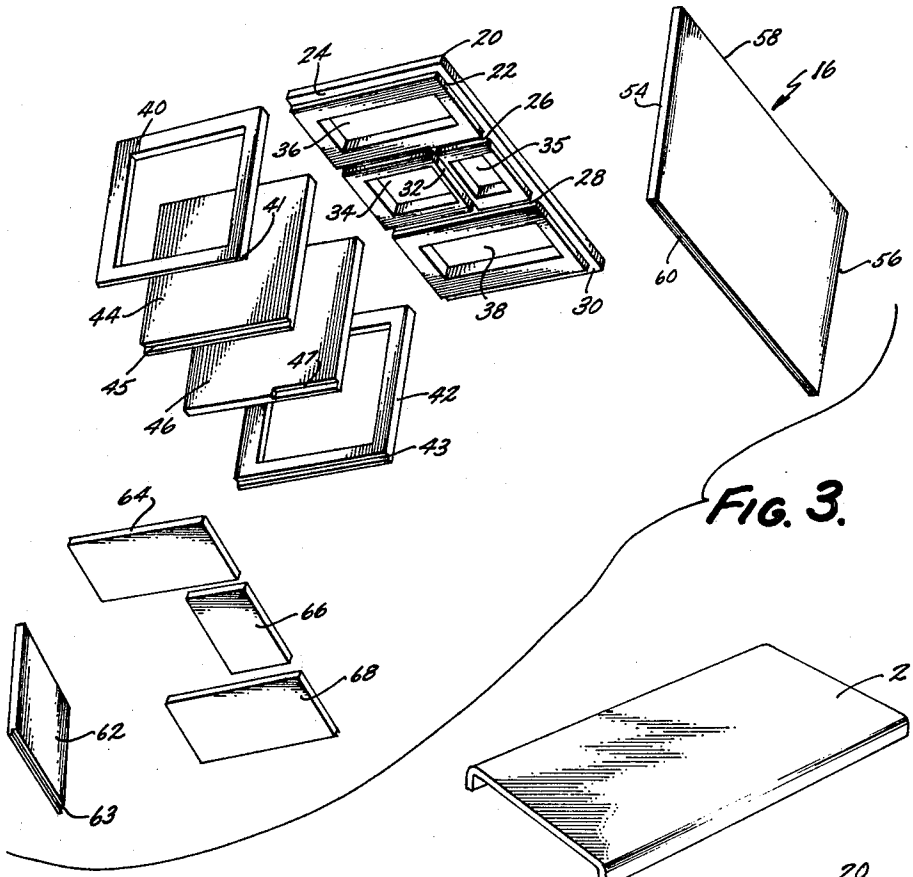

FIG. 3.

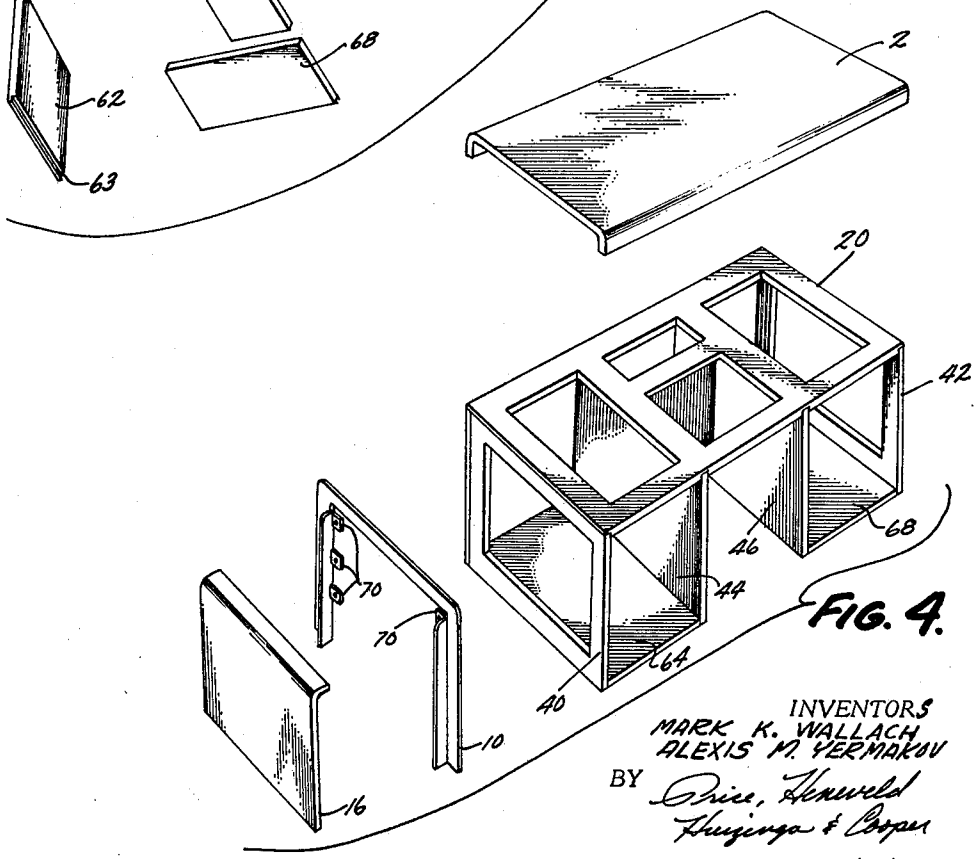

FIG. 4.

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FURNITURE CONSTRUCTION

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U.S. Cl. 312—195 6 Claims

ABSTRACT OF THE DISCLOSURE

This disclosure relates to furniture construction in which a novel end structure is attached to a rigid furniture construction comprising, for example, a rigid three box construction. In one embodiment there is formed a subassembly comprising a sub-top, back, bottom, four upstanding bulkhead members positioned along and perpendicular to the sub-top and back, and a centrally located fifth bulkhead member which is parallel to the back. The back and the sub-top can be grooved to receive the four upstanding bulkheads. The subassembly has three aligned, interconnected, rigid boxes. The two end boxes have an open side.

The subassembly can be employed in the construction of desks, credenzas, and the like. A finished top and a finished back panel are attached to the subassembly. Leg units and finished side panels are then applied to substantially cover the subassembly. Drawers and shelves can be added to make a finished unit.

The novel end structure comprises a flat, inverted, U-shaped member which is coextensive with the furniture top and two sides thereof and has a pair of flat, longitudinal bars attached to the legs of the U-shaped members. The bars are substantially perpendicular to the plane of the U-shaped members and preferably contain a finished filler therebetween.

This invention relates to furniture construction. In one of its aspects it relates to a furniture construction in which a rigid, interconnecting box construction is employed to provide improved torsion resistant furniture. In one aspect of the invention, there is first formed a subassembly comprising a sub-top, back, end bulkhead members and central bulkhead members positioned perpendicular to the sub-top and back, at least one bottom closure member positioned parallel to the sub-top and attached to the back and the upstanding bulkheads.

In another of its aspects, the invention relates to a furniture construction as has been hereinbefore described, wherein the sub-top and back are grooved to receive the bulkheads.

In a still further aspect of the invention, it relates to a furniture construction as hereinbefore described, wherein a desk is made by attaching to the subassembly hereinbefore described, a fifth bulkhead member positioned parallel to the back between the central bulkhead members to form a knee panel, a finished top, a finished back, leg members and finished side panels.

In a still further aspect of the invention, a credenza, or cabinet structure is made by adding a finished top, a finished back, leg members, and a finished side panel, and drawers to the subassembly as hereinbefore described.

In a still further aspect, the invention relates to a novel end structure for furniture which end structure comprises a relatively flat, inverted, U-shaped member which extends from the bottom to the top of the furniture unit and is coextensive with the top and two opposite sides, and a pair of flat, longitudinal members attached to the legs of the inverted, U-shaped members substantially perpendicular to the plane of the U-shaped members.

In the construction of furniture, such as office pedestal desks, it is common practice to make the components of the furniture individually and put them together. For example, a pedestal desk is generally made by constructing the pedestal members, constructing a top, and in some cases a back panel, and fastening the pieces together. Sometimes legs are made on the pedestal, and sometimes they are added to the pedestal members after the desk is substantially completely constructed.

When each pedestal is supported by four legs, the bulk of the weight is supported directly by the legs, and there is no bending moment on the top and/or back panel. However, when the desk is subjected to torsional forces, such as in moving furniture, the bulk of the forces is borne by finished top and back panels. In order to provide torsion resistance with these kinds of desks, heavy finished tops must be constructed.

The tendency in modern office furniture is to support the entire desk by two pairs of legs, each pair positioned at either end of the desk. Such a construction is shown in Abrahamson, U.S. Patent No. 3,125,387. In this kind of construction, the top is subjected to a bending stress even if a back panel containing a reinforcing member is provided. Further, this kind of desk also has low torsional strength, and the finished top and back panels must bear the torsional as well as bending moment stresses.

In office furniture, strength and durability are important due to the frequent moving and abuse to which the furniture is frequently subjected. Further, the degree of torsional resistance of a piece of furniture is a measure of the quality of the furniture. Thus, it is desirable to provide a construction which is durable and resistant to torsional and bending stress without the use of substantial amounts of metal or other constructional material. The construction must be such that the finished wood panels preferably do not bear the bulk of these stresses.

We have now discovered that a furniture construction can be obtained to satisfy these prerequisites, wherein the finished assembly has substantial torsional strength as well as bending strength about a horizontal axis, the construction employing a subassembly in which a rigid three-box unit is provided. The finished panels are attached to the subassembly and consequently bear no substantial strain.

By various aspects of this invention, one or more of the following or other objects can be obtained.

It is an object of this invention to provide a novel end and leg structure for a furniture construction.

It is an object of this invention to provide a light weight furniture construction in which the final unit will have substantial torsional, as well as bending strength.

It is a further object of this invention to provide an office furniture construction, whereby the exterior finished layers are relatively free from stresses associated with normal support of the furniture, or with abnormal abuse of the furniture.

It is a still further object of this invention to provide a furniture construction, wherein support and constructional features are substantially divorced from finished exterior parts.

It is a still further object of this invention to provide a novel furniture subassembly from which numerous office furniture units can be constructed.

Other aspects, objects, and the several advantages of this invention are apparent to one skilled in the art from a study of this disclosure, the drawings, and the appended claims.

According to the invention, there is provided a furniture construction in which a novel leg assembly is attached to a rigid, self-supporting body construction. Preferably,

the body construction employs a plurality of interconnecting rigid boxes which are highly resistant to torsional as well as bending stresses. The rigid boxes are such that the boxes are closed, i.e. contain six sides if the ratio of length to width of any of the sides of the box are outside of the range of 0.67 to 1.5. If all of the sides of the box have length to width ratios in the range of 0.67 to 1.5, one of the six sides can be omitted. For example, in the construction of a two pedestal desk with a knee hole therebetween, the end pedestals would form a box, all of whose sides have length to width ratios in the range of 0.67 to 1.5 and an open side would be left for a drawer. The two pedestal box structures would be connected by a closed central box whose sides would be formed by a knee panel, a back panel, the desk top, a bottom and the sides of the pedestals.

The novel leg and end structure for the furniture comprises a flat, inverted, U-shaped member which is coextensive with the top and two sides of the furniture. A pair of flat bar members are attached to the legs of the inverted, U-shaped members, and with the U-shaped members, form the legs of the furniture. The bar members are positioned substantially perpendicular to the inverted, U-shaped members, and preferably contain a finished filter panel coextensive therewith. The leg structure, which is preferably metal, is light in weight, yet sturdy, due to the perpendicular relationship of the components of each leg member.

In one embodiment, finished furniture panels are attached to a subassembly which comprises a sub-top member, a back member joined to said sub-top member and substantially perpendicular thereto, first and second bulkhead members positioned at the ends of the sub-top and back members and joined thereto, third and fourth bulkhead members positioned between and substantially parallel to the first and second bulkhead members and joined to the back and sub-top members, and at least one bottom closure member attached to the first, second, third, and fourth bulkhead members, and to the back member to make a rigid interconnecting box construction.

Preferably, the sub-top and the back members are grooved to receive the first, second, third, and fourth bulkhead members and the sub-top member is grooved to receive the back member. Also, the first, second, third, and fourth bulkhead members are grooved on the inner side to receive the bottom closure members.

The subassembly can be employed in the construction of a desk, for example, by simply adding a fifth bulkhead member between the third and fourth bulkhead members, parallel to the back member, a finished top member to the sub-top, leg members to the first and second bulkhead members, and attaching finished side panels to the first and second bulkhead members. Drawers can be added to the two open boxes at the ends of the structure.

A credenza, or cabinet, or the like, can be made from the subassembly in substantially the same manner as the construction of the desk, except that the fifth bulkhead member is not used, and the central bottom member extends to the front of the structure. Of course, the credenza or cabinet would be provided with drawers.

Also, according to the invention, there is provided a method for constructing furniture comprising, constructing a rigid subassembly containing a plurality of interconnected structural zones, which together form a self-supporting composite unit, adding finished layers to the subassembly to cover a substantial portion of the subassembly, and adding leg and drawer units to form the finished product.

The invention will now be described with reference to the accompanying drawings in which:

FIG. 1 is a perspective view of an embodiment of the invention in the form of a desk;

FIG. 2 is another perspective view of the embodiment of FIG. 1, showing the rear portion of the desk;

FIG. 3 is an exploded view of a subassembly employed in the desk shown in FIGS. 1 and 2;

FIG. 4 is an exploded view of the desk shown in FIGS. 1 and 2 showing the construction with the subassembly shown in FIG. 3;

FIG. 5 is a sectional view of the desk shown in FIGS. 1 and 2 taken along lines V—V of FIG. 2; and

FIG. 6 is a sectional view of the leg units employed in the desk shown in FIGS. 1 and 2 taken along lines VI—VI of FIG. 2.

Referring now to FIGS. 1 and 2 in particular, a desk containing a desk top **2**, a plurality of outer drawers **4** and a middle drawer **6** is provided. An end panel **10**, which is curved at the top portion thereof, is contained between a leg structure **10**. The desk contains a finished back unit **16** which fits between the leg structures **10** and joins with the top **2** to make a smooth, continuous surface at the corner. As can be seen from FIGS. 4 and 6, the leg assembly **2** comprises a generally flat, U-shaped member **12** which extends to the top of the desk and a pair of flat bar members **14** which are welded to U-shaped member **12** through pins **18**. It is, however, within the scope of the invention to place pins **18** perpendicular to the U-shaped members **12** or to eliminate pins **18** and simply weld bar members **14** to U-shaped members **12**. As can be seen from the drawings, the panel **8** takes the shape of the members **14** and is positioned therebetween. On the other hand, U-shaped member **12** is coextensive with the line of the desk along the front, top, and back panels which are positioned between the U-shaped members **12**.

The furniture according to the invention is preferably constructed with a subassembly shown in exploded view in FIG. 3 and in assembled form in FIG. 4. With specific reference to FIG. 3, the subassembly comprises a sub-top member **20** having notched edges **24, 22, and 30.** Grooves are also provided at **26, 28,** and **32.** Grooves **24, 26, 28,** and **30** are substantially parallel to one another, whereas groove **32** is substantially perpendicular to grooves **24, 26, 28,** and **30.** The sub-top is cut out at **34, 35, 36,** and **38** to reduce the weight of the final article.

A pair of end bulkheads **40** and **42** are placed in grooves **24** and **30,** respectively, of sub-top **20.** Bulkheads **44** and **46** are positioned in grooves **26** and **28,** respectively, of sub-top **20.** These bulkheads are then fastened to the sub-top member. A back member **16** containing a finished outer panel and sides **54, 56, 58,** and **60** is then positioned with side **58** in groove **22.** Grooves can also be provided in the inner surface of the back panel **16** at sides **54** and **56** and in the central portion for the positioning of bulkhead members **40, 44, 46,** and **42,** respectively. The bulkhead members are then fastened to the back member **16** through suitable mechanical fastening means such as screws, or by chemical adhesives. A knee wall panel is then placed into groove **32** between bulkheads **44** and **46,** and is attached to each of these members by screws, nails, or by employing a suitable chemical adhesive. The bottom member **64** will be placed between bulkheads **40** and **44.** Preferably for this purpose, notches are provided in the bottom portion of bulkheads **40** and **44** at **41** and **45,** respectively. Similarly, bottom **56** is placed between bulkheads **44, 46,** and knee wall panel **62,** and bottom panel **68** is positioned between bulkheads **46** and **42.** Notches are preferably provided, for example at **47** and **43,** in these bulkheads to receive the bottom panels. A notch is also provided in knee wall panel **63** to receive the bottom wall panel **66.** The bottom wall panels **64, 66,** and **68** are then secured in place by screws, nails, or chemical adhesives. Thus, the subassembly comprises three interlocking box members. The two end box members will have an open side, whereas the third box member will be closed.

As can be seen especially in FIG. 4, the end boxes have sides whose length and width dimensions are all approximately equal. In any case, the end boxes will have sides with a length to width ratio in the range of 1.5/1 to .67/1.

In this range, the sixth side of the box can be omitted without any loss in torsional strength.

The middle box, on the other hand, has two sides which have a high or a low length to width ratio. In this case, the ratio will be generally greater then 1.5/1, or less than .67/1 (depending on terminology for length and width). In this box, all six sides have structural members.

It can be seen that submembers, such as **20**, **40**, and **42** have portions cut out in the middle of the sides of the structural boxes. It has been found that for torsional strength, the middle sections of the sides of the boxes can be omitted.

FIG. 4 shows the method of constructing the desk once the assembly has been provided. The finished top **2** is attached preferably through screws to the subassembly members. The leg assemblies **10** are then attached to the end bulkhead members through tabs **70** and suitable screws (not shown). The end panel **16** can be attached then to the end bulkhead members through screws (not shown) from the inside. For the purposes of simplicity, only one leg assembly and one end panel have been shown in FIG. 4. However, it is obvious that another leg assembly and end panel will be attached to the opposite side of the subassembly to complete the desk.

In FIGS. 1 and 2, as can be seen, the flat bar members **14** give the impression of passing through the desk, beneath top **2**. However, as can be seen from FIG. 4, the bar members **14** terminate at the edge of U-shaped member **12**. The use of the rigid box construction allows the leg structure to be employed without passing bar member **12** through the desk. Without the rigid construction, a bar member **12** would have to pass through the furniture beneath the top to provide sufficient support and rigidity for the furniture.

The use of tabs **70** on the inner portion of the leg structure **10** provides a convenient and pleasing method of attaching the leg structure to the desk, whereby the means of attachment will be hidden from view.

In FIG. 5, the relationship of the subassembly to the finished panels is shown. Additionally, the positioning of the back **16** within the groove **22** of the sub-top **20** is shown and the positioning of knee wall panel **62** in groove **32** can also be seen. Bottom panel **66** is positioned in notches **61** and **63** of the back wall panel and the knee wall panel, respectively.

Whereas the invention has been described with reference to a desk, it is obvious that other furniture pieces can be constructed with the subassembly according to the invention. For example, in the event a credenza of the same design is desired, the subassembly can be formed without knee wall panel **62** and with bottom wall panel **66** extending to the front of the unit. In this case, all three of the boxes would have sides having length to width ratios in the range of 1.5/1 to .67/1. In this form, finished top panels and side panels, as well as leg structures of the form shown in the drawings can be attached in the manner shown in the drawings. However, in this case, the front will have drawers or doors covering each open-ended box.

The finished panels can be wood, plastic, or any other suitable material which can serve as a decorative outer surface for the furniture.

While we do not wish to be limited to a particular theory, torsional strength for any given box structure is a function of the cube of length of a side so long as the sides are of a thickness substantial enough to withstand the strain. Further, it is known that a cube has high torsion resistance as compared with a flat board, for example. Thus, the interlocking box structure will maximize torsional resistance with a minimum of weight.

In torsional resistance it is known that the bulk of the stress is carried by the outer portions of the sides. Thus, the central portions of the box sides can be omitted without substantial loss of torsional strength. Preferably, in the construction of the subassembly, according to the invention, panel stock is employed.

It has also been found that there is no loss in torsional strength if a side is omitted so long as the box is substantially regular, i.e. cubical in shape. The sixth side can be omitted so long as the ratio of length to width of each side is in the range of 1.5/1 to .67/1.

Whereas the invention has been described with reference to construction of furniture employing a subassembly to which finished panels are attached, it is to be emphasized that one embodiment of the invention includes the construction of furniture wherein a subassembly as such is not employed. In this broad concept, a one piece top and back, made from a rigid plastic, for example, could be used to construct an interlocking box structure by attaching a bottom, four bulkhead members and a knee panel to form a desk. In other words, although the subassembly is preferred in constructing the rigid three box assembly, it is not essential.

The novel end structure of the furniture provides not only a means for supporting the furniture, but also provides a means for containing the end of the top and back walls. Thus, the ends of the top and back walls need not be finished. The end structure also provides a means for positioning the end panel and since the end panel is coextensive with the bars, which are attached to the U-shaped member, the ends of the panel need not be finished either. The end construction also provides a means for attaching the legs to the main body of the furniture through tabs **70**, whereby the means for attaching the leg structure will be hidden from view.

Whereas the invention has been described with the inverted, U-shaped members positioned at the end of a desk, it is also within the scope of the invention to put the U-shaped members on the front and the back of the furniture with the continuous wood surfaces running from side to side rather than from front to back. The flat bar members would then project from the front and back sides of the unit and would contain filler panels therebetween forming the front and back walls of the furniture.

Whereas the invention has been described with reference to a desk having a back wall panel flush with the back edge of the top and sides, it is within the scope of the invention to provide a desk or similar article with a recessed back panel. In this case, finished filler panels would be placed between the recessed panels and the back edges of the top and sides of the construction.

In carrying out the invention, it is also possible to provide a sub-back and a finished back panel in constructing furniture according to the invention. The sub-back can be part of the subassembly and can be similar in construction to the sub-top.

Reasonable variation and modification are possible within the scope of the invention without departing from the spirit thereof.

We claim:

1. A furniture construction comprising:

a top panel;

a flat, inverted, U-shaped member extending from the bottom to the top of the furniture unit, and extending laterally from one side of said furniture to an opposite side thereof, said top panel contacting an upper portion of said inverted U-shaped member, the upper surface of said top panel being substantially flush with the top edge of said inverted U-shaped member, and said top panel being laterally coextensive with the top portion of said inverted U-shaped member such that the sides and top of said furniture smoothly follow the contour of said inverted U-shaped member;

a pair of flat bar members attached to the inside of each leg of said inverted, U-shaped member, the plane of said flat bar members being substantially perpendicular to the plane of said U-shaped members, said flat bar member extending from the bottom por-

tion of said flat, U-shaped member to a point just below the top of a laterally extending portion of said U-shaped member;

a finished filler means laterally coextensive with said bar members and vertically coextensive with the top portion of said bar member such that the said filler means smoothly follows the contour of said bar members.

2. A furniture construction according to claim 1, wherein said bar member is slightly spaced from said U-shaped member, and is attached to said U-shaped member through pins which are substantially perpendicular to the plane of said bar members.

3. A furniture construction according to claim 1, wherein said side structure is attached to the main frame of said furniture through laterally extending tabs positioned in the plane of said U-shaped member, but inwardly thereof and behind said filler means.

4. A desk construction having a top member, a back panel, a plurality of drawers opposite said back panel, forming a front surface including a knee wall and a pair of side structures as defined in claim 1, wherein the back panel, top member and front surface contact said inverted, U-shaped members and generally follow the line of said U-shaped members.

5. A furniture construction comprising:

a rectangular top panel having two sides and two ends, and side enclosure means extending downwardly from said top panel at the side edges thereof;

flat, inverted, U-shaped support members extending from the bottom to the top of the furniture unit, and extending laterally from one side of said furniture to an opposite side thereof, said U-shaped support member located at each of the ends of said top panel, and including legs extending from the corners of said top panel downwardly beyond the lower extremities of said side enclosure means, and including a bight portion extending between said legs, said legs each having a flat surface abutting the ends of one of said side enclosure means, said bight portion having a flat inner surface abutting the end edges of said top panel;

a pair of flat bar members attached to the inside edge of each leg of said inverted, U-shaped member, the plane of said flat bar members being substantially perpendicular to the plane of said flat surfaces of said legs and bight portions of said U-shaped members, said flat bar member extending from the lower end of the said legs of said U-shaped member to a point just below the top of the said bight portion of said U-shaped member; and a panel means located within the confines of said legs and bight portion.

6. The furniture construction of claim 5 in which the filler panel means, located within the confines of said legs and bight portion, is coextensive with said bar members and vertically coextensive with the top portion of said bar member such that said filler means smoothly follows the contour of said bar members.

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U.S. Cl. X.R.

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