Nov. 17, 1964 F. G. STARK 3,157,446

FURNITURE CONSTRUCTION

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Fig. 1.

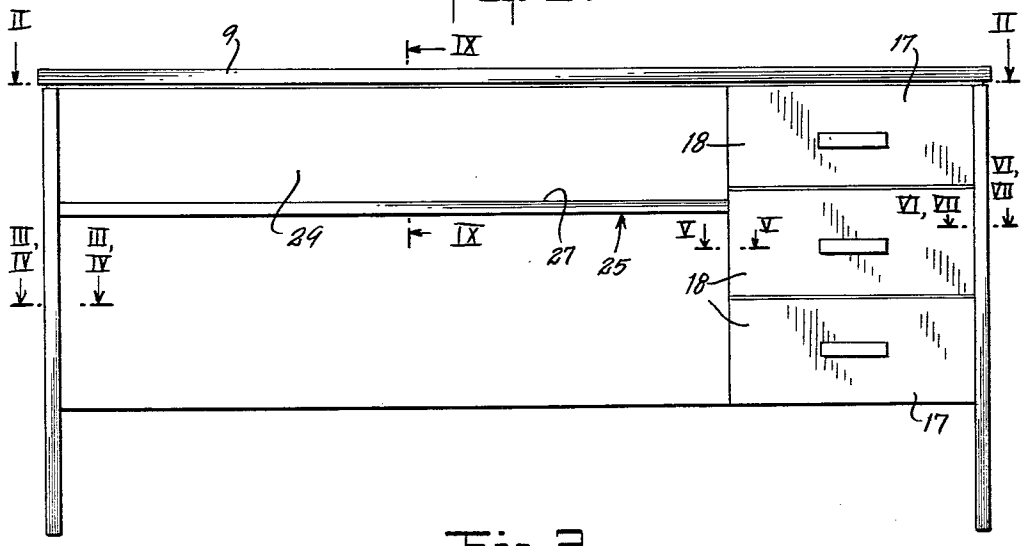
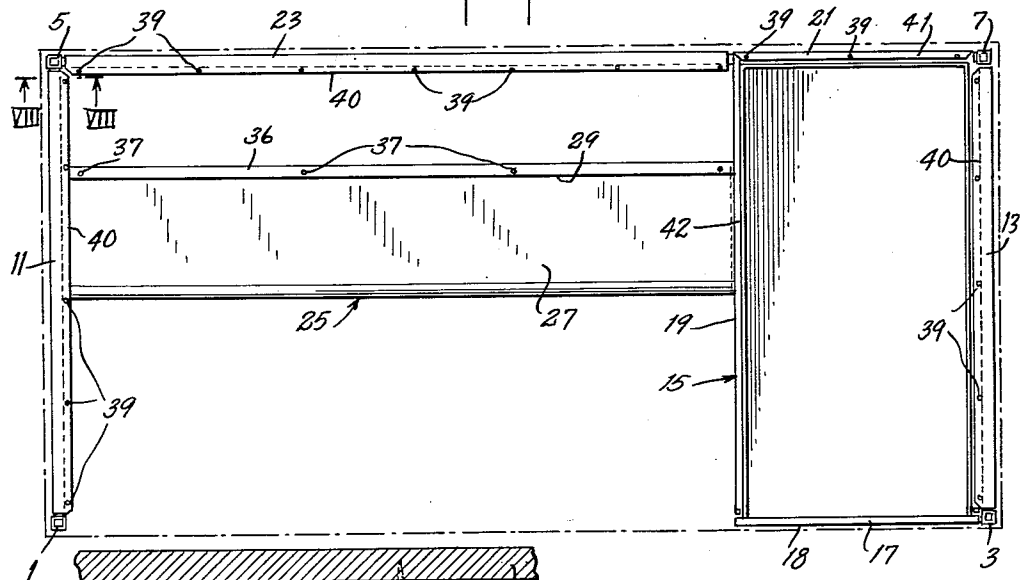


Fig. 2.



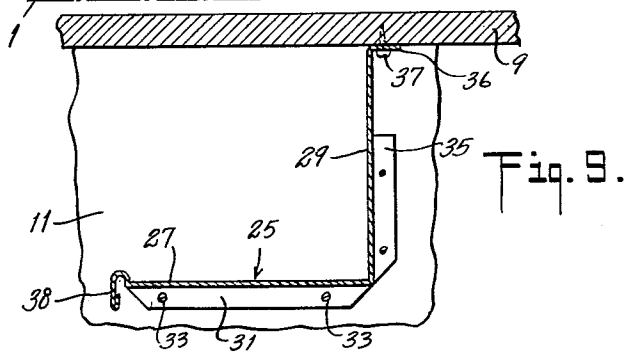


Fig. 3.

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Fig. 4.

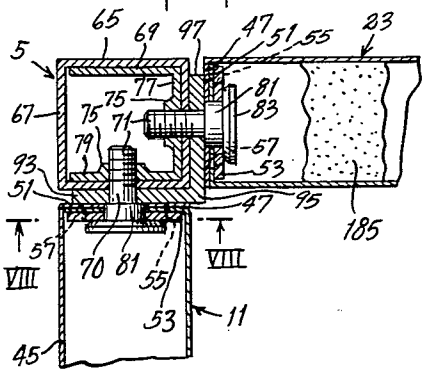


Fig. 5.

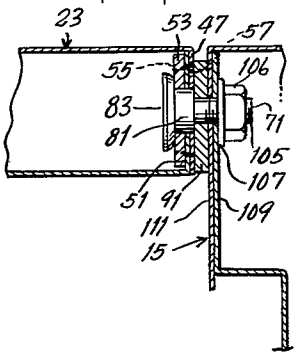
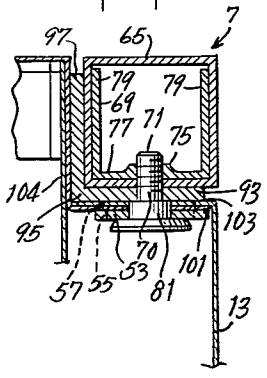


Fig. 6.



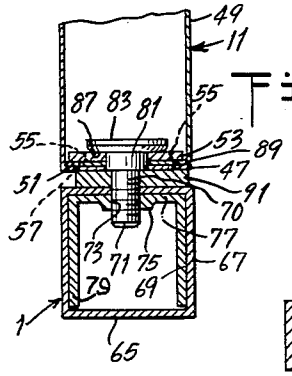


Fig. 3.

Fig. 7.

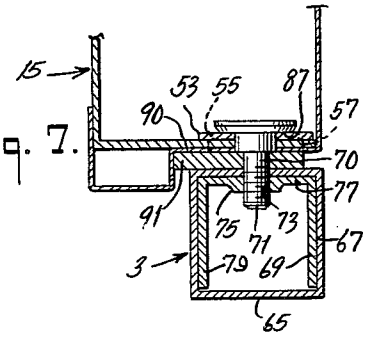


Fig. 8.

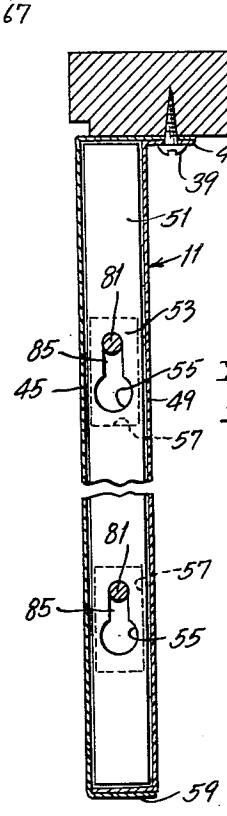


Fig. 10.

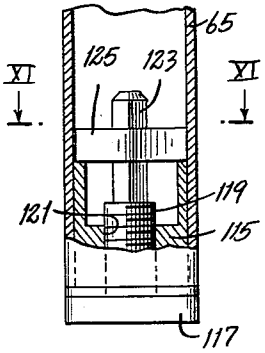
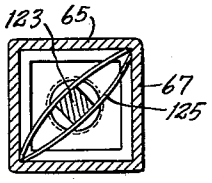


Fig. 11.



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Fig. 12.

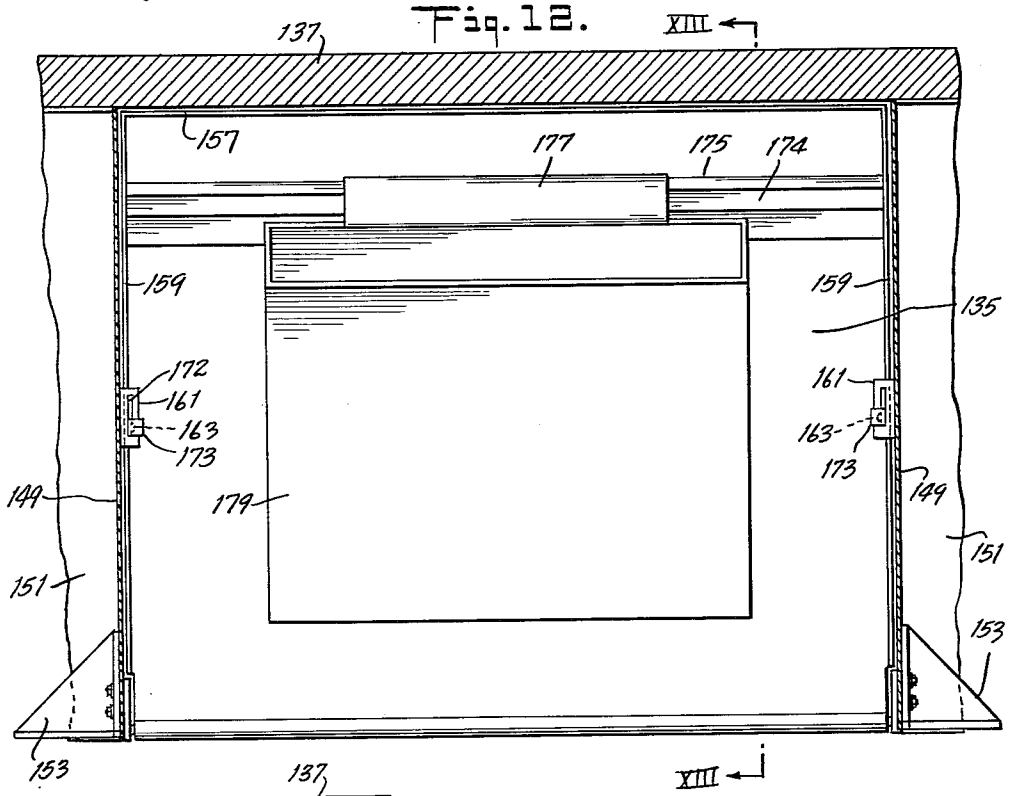


Fig. 13.

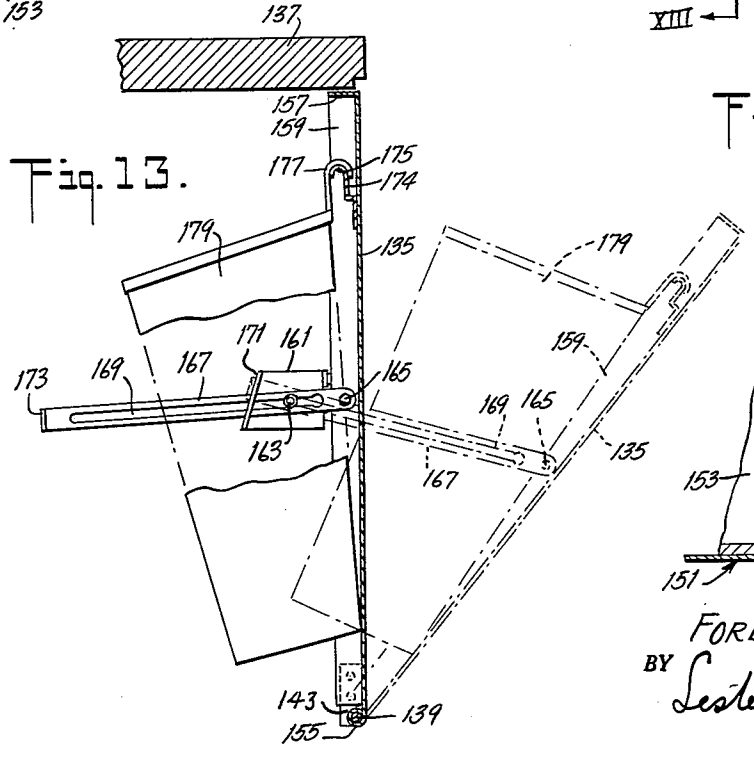
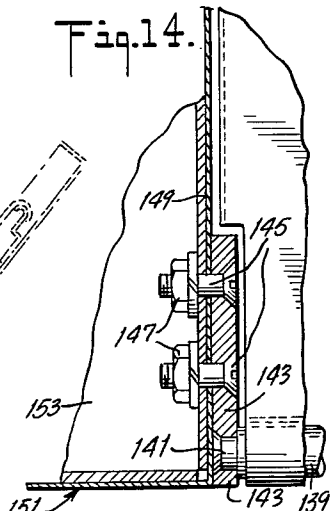


Fig. 14.



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United States Patent Office 3,157,446 Patented Nov. 17, 1964

3,157,446

FURNITURE CONSTRUCTION

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Filed Sept. 22, 1960, Ser. No. 57,806
28 Claims. (Cl. 312—195)

This invention relates to furniture constructions and more especially to furniture constructions which comprise panels. The invention more particularly relates to furniture constructions in which the panels may be easily assembled and disassembled with respect to adjacent parts of the furniture structure.

In furniture constructions for various purposes such as for offices, libraries or other public places, it is necessary from time to time, in order to move the articles of furniture to different locations or for other reasons, to disassemble and to reassemble the furniture comprising panels and members cooperating therewith to form the article of furniture. In many cases it has been necessary heretofore to remove fasteners located inconveniently or in more or less inaccessible places which serve to connect parts of the furniture construction together, for example, the connection between a panel and a support or leg. Insertion and removal of such fasteners require substantial time and delay in the operations of original assembly and of disassembly and reassembly for relocating the article of furniture.

Moreover, it is desirable and in many cases necessary to modify the form of the article of furniture; for example to change a desk from one in which the drawer pedestal is at the right to one in which this drawer pedestal is at the left, or it may be desirable to change the dimensions of the article of furniture such as a desk or a cabinet by utilizing panels of different dimensions, for example, of different horizontal lengths. To accomplish these purposes it is desirable to provide connecting means between panels and adjacent members of the structure, for example, the supporting legs of the article of furniture, which will make possible quick disconnection of the panel from the adjacent members and quick reconnection thereof when the parts, including the panel of the article of furniture, are reassembled.

It is an object of the invention to provide a construction for an article of furniture which makes possible easy assembly and disassembly.

It is a further object of the invention to provide a panel construction which is capable of rigidly maintaining its form and adapted to cooperate with means for connecting the panel to the adjacent parts of the article of furniture to provide a rigid structure.

It is another object of the invention to provide a support, such as a leg, having a construction which secures a rigid support member which carries means adapted to engage an adjacent member of the article of furniture, such as a panel, to cooperate therewith to form a rigid assembled structure.

It is a still further object of the invention to provide a panel construction of sheet material of relatively small gauge which affords a substantially rigid panel which is capable of cooperating with a fastening means carried by a support structure, such as a leg, to securely and rigidly hold the panel to the support but providing easy assembly and disassembly.

An additional object of the invention is to provide a support, such as a leg, of unique construction, utilizing material of relatively small thickness and providing for carrying the means for easily connecting the support to a panel or other adjacent part of the article of furniture and for easy disconnection therefrom.

It is another object of the invention to provide a fastener of unique form which may be secured to a support or leg or other part of the furniture construction and is adapted for easy connection to and disconnection from an adjacent part of the construction for assembly and disassembly.

In one aspect of the invention the panel construction has the feature that it is formed of relatively small gauge sheet material to provide two parallel panel walls and two transverse walls connecting the parallel panel walls in spaced relation to each other. Preferably each of the panel walls is provided along opposite edges thereof with flanges transversely of the panel wall, the flanges of each panel wall being disposed in inverted relation to the flanges of the other panel wall, the flanges of a given one of the panel walls being disposed between and preferably in engagement with the respective inner surfaces of the flanges of the other panel wall and with the edges of the inwardly disposed flanges of the given panel wall adjacent or in abutting relation to the other panel wall. Means are provided to secure the two panel walls together in the spaced relation, preferably by welding the flanges thereof together. Such a panel may provide a smooth or finished exterior surface of at least the panel wall the flanges of which are disposed exteriorly of the flanges of the given panel wall, and ordinarily this exterior surface will be exposed when the panel is assembled in the article of furniture.

In accordance with another feature of the invention the panel of the type just described may be provided with a reinforcing strip or plate disposed preferably adjacent the inner surface of a flange of the given panel wall. This plate is provided with a keyhole opening or keyhole openings therein which, in the manner to be described, afford the cooperation and engagement of a fastener secured to an adjacent member of the article of furniture, for example, a leg or support. An opening may be formed in the flanges of the panel walls about the keyhole opening of the strip or plate to provide for clearance between the fastener and the flanges when the fastener is inserted in the keyhole opening.

In another aspect of the invention a support or leg has the feature that an elongated tubular member of rectangular cross section is utilized within which an element of channel section is disposed with the web and flanges of the channel element adjacent and preferably in engagement with the inner surfaces of the respectively adjacent walls of the tubular member. The walls of the tubular member and the web and flanges of the channel element are of relatively small thickness. It has been found that by utilizing the combination of the tubular member and the channel element the requisite rigidity and strength for the support or the leg of the article of furniture are secured with less cost than when a tubular member having a single wall of suitable wall thickness is used, having regard also to the necessary fabricating operations.

A further feature of the invention in this aspect thereof relates to the form of the fastening means and the provision for securely holding this fastening means in the support or leg. It will be understood from the description to follow in connection with the drawings that the fastener in the form of a stud is securely held to the assembly of the tubular member and the channel element and serves also to hold these two parts securely together while at the same time providing for the desired easy connection of the stud to an adjacent part of the article of furniture, for example to a panel thereof constructed as above described. In most cases the stud will be engaged with the transverse wall or with the strip or plate cooperating therewith, as above mentioned, which is provided with the keyhole opening for easy assembly and disassembly of the panel with respect to the support or leg.

Another feature of the invention relates to the provision of a spacer between a main structure of the article of furniture and an adjacent part thereof, usually a support. This spacer may be disposed, for example, between a given wall or a flange of a panel of the type described and an adjacent member of the article of furniture, for example, a support or leg. This spacer preferably is dimensioned and disposed with respect to the exposed outer surfaces of the panel and of the cooperating support to form a recess between the panel and the support, the edge of the spacer being inset from the exposed surfaces to secure the recess.

The invention will be more particularly described in connection with a desk construction but it will be understood that the features which have been referred to briefly above may be utilized in other articles of furniture which are constructed with panels and adjacent members or supports.

Other objects and features of the invention will be understood from the description to follow taken in connection with the drawings in which:

FIG. 1 is a front elevation of a desk having a drawer pedestal at the right hand thereof;

FIG. 2 is a horizontal section on line II—II of FIG. 1;

FIGS. 3 and 4 show fragmentary views in section taken on line III—III; IV—IV of FIG. 1;

FIG. 5 is a fragmentary horizontal section taken on line V—V of FIG. 1;

FIGS. 6 and 7 are fragmentary horizontal views in section taken on line VI—VI; VII—VII of FIG. 1;

FIG. 8 is a vertical section on line VIII—VIII of FIG. 2;

FIG. 9 is a vertical section on line IX—IX of FIG. 1;

FIGS. 10 and 11 show a detail of an adjustable foot for a supporting leg;

FIG. 12 shows in elevation viewed from the front of the desk a rear panel supported for pivotal movement thereof;

FIG. 13 is a vertical section on line XIII—XIII of FIG. 12;

FIG. 14 shows to enlarged scale a detail of the connection provided for support of the pivoted panel of FIGS. 12 and 13.

The desk construction shown in FIGS. 1 and 2 comprises front legs 1 and 3 respectively at the left and right hand sides of the desk. At the rear of the desk are disposed left hand leg 5 and right hand leg 7. The legs 1, 3, 5 and 7 are disposed at the corners of the desk and with the upper ends thereof below the respective corners of the top 9 of the desk the rectangular outline of which is shown in dotted lines in FIG. 2. In this embodiment this rectangle is only slightly larger than the rectangle of the outer surfaces of the legs 1, 5, 7 and 3 which are parallel to the respective sides of the top. If desired, however, the top may be of larger extent with ends overhanging at the left and right in FIGS. 1 and 2 or with overhangs at the rear or at the front or both.

The desk construction comprises left hand panel 11 extending between legs 1 and 5 and right hand panel 13 extending between legs 3 and 7, the panels and legs in the present embodiment being disposed in vertical planes.

The right hand part of the desk includes a drawer pedestal 15 which includes a structure adjacent and which in part may be formed by the right hand panel 13. This pedestal includes means secured to panel 13 for slidably supporting the drawers 17 having heads 18 flush with the forward face of leg 3 when the drawer is closed, as shown at the right in FIG. 2. The pedestal also includes a panel wall 19 at the left side of the pedestal which similarly carries means for slidably supporting the left hand side of the drawers. The pedestal at the rear thereof is provided with a panel 21 closing the pedestal at the rear side thereof, this panel being secured to the leg 7 in the manner to be described and being in alignment with the main rear panel 23 of the desk which extends between the leg 5

and the corner of the pedestal between the panels 19 and 21.

Also extending between the left hand panel 11 and the panel 19 of the pedestal is a shelf structure 25 made of sheet material having a horizontal shelf portion 27 and a vertical back portion 29. The shelf 27 is provided with a downwardly extending end flange 31 which is secured by suitable fasteners 33 to the left hand panel 11. The vertical back 29 of the shelf structure is provided with a stiffening end flange 35 which also may be secured to the panel 11. The vertical back also carries along its horizontal top edge a flange 36 which engages the under side of the desk top 9 and is secured thereto by wood screws 37. End flanges similar to the flanges 31 and 35 may be provided at the right hand end of the shaft 25 and may be similarly secured to the panel 19 and to the top 9. The shelf portion 27 is formed along its front edge with a bead of arcuate contour connected to a downwardly extending flange 38 to provide a smooth edge, the bead serving also to resist forward sliding movement of objects on the shelf. The panels, pedestal and shelf may be of metal.

As shown more particularly in FIGS. 3 and 4 panel 11 comprises an outer vertically disposed panel wall 45 extending from adjacent the forward leg 1 to a point adjacent the rearward leg 5 of the desk. This panel wall is provided with flanges 47 extending at right angles to the plane of the wall 45. The panel 11 further comprises an inner panel wall 49 extending parallel to the panel wall 45 and having flanges 51 in inverted relation to the flanges 47 of the panel wall 45. In this embodiment the flanges 51 engage the inner opposed surfaces of the flanges 47 of the panel wall 45 and are of such horizontal dimension as substantially to abut the inner side of the panel wall 45 with the outer surface of the panel wall 49 substantially in alignment with the edges of the flanges 47. The flanges 47 and 51 at the respective edges of the panel thus formed by the walls 45, 49 may be secured together by suitable means, for example by welding. Having regard to the close engagement of each flange 51 with the adjacent flange 47, welding may be effected if desired along the edges of the flanges 47 at the bend between the flanges 51 and the inner wall 49. In some cases spot welding may be utilized for securing the inner flange to the outer flange.

As may be seen in FIG. 8 the left hand panel 11 may be provided along its upper edge with an inwardly disposed flange 40 comprising the two transversely extending mutually engaging flanges of the outer panel wall 45 and the inner panel wall 49, the upper surface of the flange 40 providing a bearing surface against the top 9 to which this double flange is secured by screws 39 spaced along the upper edge of the panel. The rear panel 23 also may be provided with an inwardly disposed transverse double flange 40 secured by screws 39 to the under side of the top 9 of the desk. The side panels 13 and 19 and the rear panel 21 of the pedestal may be provided with flanges 40, 41, 42 which similarly may be secured to the under side of the top by screws 39.

In order to provide for securely holding the panel comprising the panel walls 45, 49 and the flanges 47, 51 to the legs 1, 5, preferably at the inner surface of each inner flange 51 is disposed a reinforcing strip or plate 53 which may be secured to the inner flange 51 as by welding or other suitable fastening means. In accordance with a feature of the invention this plate 53 is provided with a keyhole opening 55 as shown in FIG. 8. In this embodiment two keyhole openings are provided. In order to provide clearance for the fastener to be described, the flanges 51, 47 are cut away to provide openings 57, rectangular in the embodiment shown, the edges of which are clear of the outline of the keyhole opening of the plate 53. It will be understood that this provision also is advantageous in allowing the plate 53, which may be made of slightly less width and length than the flange 51, to be disposed in proper relation to the upper and lower edges

of the panel as well as to the vertical panel walls 45, 49 thereof without having the edges of the opening 57 interfere with the keyhole outline and with the insertion therethrough of the fastener. In the embodiment shown the two keyhole openings 55 are formed at locations along the plate 53, which extends vertically substantially from the bottom double wall 59 of the panel to the top double flange 40, to provide for holding the panel securely in proper vertical position when the fasteners are in place.

The supporting legs 1 and 3 of the construction being described and as shown in FIGS. 3 and 7 are alike and comprise a tube 65 of rectangular cross section, square in the embodiment disclosed, and providing an annular wall 67 extending about and defining a rectangular space within the tube. Within this rectangular space is disposed an element 69 of channel section with the exterior surfaces of the web and of the flanges respectively of this channel element engaging the inner surfaces of the three adjacent walls of the tube. Preferably the overall dimensions of the channel element along the exterior surfaces thereof transversely of its length are such that this element may be inserted by sliding movement lengthwise of the tube into the rectangular space of the tube and so as to bear snugly against the walls of the tube. The length of the channel element may be substantially the same as that of the tube for reinforcing the tube along its whole length but within the scope of the invention the channel element may be made in sections for reinforcing particular portions of the tube along the length thereof, especially the portions at which in the manner to be described the fasteners are to be located and secured to the composite of the tube and the channel element.

For the purposes of the invention preferably the fastener is a stud 70 having a form which will cooperate with the plate or strip 53 in which the keyhole openings 55 are provided. This stud may be provided with a threaded portion 71 engaging the threads of the openings 73 of a hub 75 formed on one of the walls of the channel element. With respect to the panel 11 and pedestal 15, FIGS. 3 and 7, the hub 75 is formed in the web 77 of the channel element. In the leg 5, however, hubs 75 are formed both in the web 77 and in the flange 79 of the channel element in order to provide the securing means not only for the panel 11 but for the rear panel 23 of the desk.

As shown in FIGS. 3, 4, 6 and 7, the threaded portion 71 of the stud 70 is of less diameter than a shank portion 81 which is adjacent the head 83 of the stud. The diameter of the shank portion 81 is such as to fit with fairly close clearance in the slot portion 85 of the keyhole opening 55 with the under side 87 of the head 83 in engagement with the adjacent surface of the plate 53. The shank 81 of the stud also forms a shoulder with the portion of the stud which carries the thread and this shoulder, by virtue of the stud being screwed in the threaded hub 75, is brought into engagement with the exterior surface 89 of a spacer 91 disposed between the leg 1 and the flange 47 of the panel 11. At the right hand leg 3 the spacer becomes disposed between the forward wall 90 of the drawer pedestal and the rear face of the tube 65 of the leg 3. With respect to the leg 5, FIG. 4, the spacer for panel 11 is provided by a leg 93 of an angle member 95, the other leg 97 of which is disposed between the desk leg 5 and the vertical left end of the rear panel 23. A similar angle member 95 is disposed between the desk leg 7 and the adjacent walls of the pedestal which define an angular space at the right rear corner of the desk.

Having regard to the proportions and fit of the channel element 69 with respect to the tube 65, the stud 70 screwed into the hub 75 serves to securely hold not only the spacer 91 in position against the tube 65 but also to hold the channel element 69 in position within the tube 65. As shown in FIG. 8 a plurality of keyhole openings may be provided in the plate 53, this plate extending preferably substantially for the full height of the vertical panel 11, in order that the panel may be securely held in the vertical plane and against movement in any direction with respect to the tube 65 except when it is desired to disassemble the desk by vertically lifting the panel with respect to the tube to bring the enlarged part of the keyhole opening 55 in alignment with the head 83 of the stud, so that this head and the stud shank 81 may be passed through this opening for removal of the panel from the desk leg provided by the tube 65. Similar disengagement of the stud from the forward wall 90 of the pedestal 15 may be effected for disassembling the pedestal and right hand leg 3 of the desk.

As will be seen in FIGS. 4 and 6 the angularly related legs 93 and 97 respectively of the angle member 95 serve as spacers for the panels 11 and 23 with respect to the tube 65 of the desk leg 5 and with respect to the tube 65 of the desk leg 7. In the desk leg 5, however, both the web 77 and the flange 79 of the channel element 69 are provided with hubs 75 which are threaded to receive the threaded portions 71 of the studs. The shanks 81 of these studs form a shoulder with the threaded portion, this shoulder bearing on the outer surfaces of the legs 93, 97 of the angle member 95 to hold the angle member against the tube 65 of the desk leg 5 and to rigidly secure the studs to the desk leg. The flanges 47, 51 of the panel 11 that are adjacent the desk leg 5 are provided with rectangular openings 57 similar to those of the flanges 47, 51 that are adjacent the desk leg 1. The keyhole opening 55 is provided in the plate 53 at this edge of the panel 11 and serves the same purpose as the plate 53 described in connection with the end of the panel adjacent the desk leg 1. The form of the stud 70 and the openings provided in the flanges 47 and 51 of the panel 23 adjacent the desk leg 5 and the openings provided for the stud in the tube wall 65 and in the spacer 97 are the same as described for the studs that engage the panel 11. The rear panel 23, therefore, may be assembled and disassembled with respect to the desk support leg 5 in the same manner as described for the panel 11.

The right hand rear desk leg 7, as shown in FIG. 6, is of similar form to that of the desk leg 5 of FIG. 4 but only the hub 75 carried by the web 77 of the channel element 69 is provided for the leg 7. The pedestal structure 15 is a strong rigid structure by virtue of members assembled in the structure which are not part of the present invention. This pedestal, however, provides, in the embodiment being described and as shown in FIG. 6, a pair of flanges 101, 103 in lapping relation to each other adjacent the outer face of the leg 93 of the angle member 95. The stud 70 of the desk leg 7 is provided with a shoulder between the threaded portion 71 and the shank portion 81 thereof which is disposed in the slot 85 of the plate 53 similarly to the construction with respect to desk legs 1 and 5 as described. Having regard to the structure of the pedestal 15, a plurality of studs may be utilized for the desk leg 7 and engageable with the plate 53 to secure the desk leg 7 to the pedestal 15 without the need of a similar securing means engaging the flange 79 of the channel element 69 to secure the leg 7 to the double wall 104 of the pedestal. If desired, however, such a stud connection may be utilized at the double wall 104 of the pedestal.

At the right hand end of the panel 23, as shown in FIG. 5, the pedestal 15 may be secured to this panel by means of a stud 105 of the same general form as the studs described in connection with the desk legs 1, 3, 5 and 7. This end of the panel 23 is formed with the flanges 47 and 51 the same as described in connection with panel 11. At this end of the panel also is disposed a plate 53 having a keyhole opening 55 therein for passing the head 83 of the stud 105 therethrough, the shank 81 of this stud engaging the slot portion 85 of the keyhole opening in the manner described. In this part of the structure the stud 105, however, is provided at the end thereof with a nut 106 disposed within the space of the

pedestal and threaded on the threaded portion 71 of the stud and bearing upon washer 107 which engages the inner layer 109 adjacent the outer layer 111 of sheet material of which the pedestal at this part thereof is formed. Thus, the rear panel 23 may be secured to the pedestal by means of a stud similar to that previously described without the necessity of providing a threaded hub on the pedestal because ordinarily it is possible to reach the nut 106 through the space occupied by the drawers of the pedestal. As shown in FIG. 5, however, a spacer 91 may be provided between the right hand end of the panel 23 and the pedestal, the edge of this spacer being set inwardly from the rear faces of the panel 23 and the pedestal 51 to form a recess similar to those described in connection with the desk legs 1, 3, 5 and 7.

It will be seen that when the panels 11 and 23 and the pedestal are engaged with the studs 70 carried by desk legs and the stud 105 is secured in place, the panels, desk legs and pedestal provide a rigid desk structure with the parts thereof securely held together but capable of readily being disassembled when desired.

In FIGS. 10 and 11 is shown a device for adjusting the overall length of a desk leg of the construction described utilizing a tube 65 of square section and providing an annular wall extending about and defining a square space within the tube. The device comprises a plug 115 secured in the lower end of the tube 65 and a square foot 117 having a threaded shank 119 screwed in a threaded hole 121 of the plug 115 and rotatable therein on the vertical axis. Extending upwardly from the shank 119 is a spindle 123 of square section providing four flat faces disposed about the axis of the spindle. Spanning diagonally across between the opposite corners formed by the walls 67 of the tube 65 is a spring element 125 comprising two leaves which are sprung apart somewhat and engage opposite faces of the spindle 123. When the foot 117 of square outline corresponding to the section of the tube 65 is rotated, the threaded shank 119 turning in the threaded hole 121, the base surface of the foot 117 will be moved vertically upwardly or downwardly depending upon the direction of rotation. Concomitantly the faces of the spindle 123 that are in engagement with the spring element 125 will be rotated from such engagement and the adjacent faces of the spindle then will be brought into engagement with the spring element 125, the square of the foot again coinciding with that of the tube, the effective vertical length of the leg of the desk thus being adjusted. The device of FIGS. 10 and 11 is disclosed and claimed in my copending application, Serial No. 35,231, filed June 10, 1960.

In FIGS. 12, 13 and 14 is shown a feature of a construction for a desk in which a rear panel 135 is supported for pivotal movement thereof upon an axis spaced downwardly from the top 137 of the desk. This pivotal axis may be provided by a rod 139 extending between and secured as by riveting shoulder ends 141 thereof in plates 143 that are secured by screws 145 and nuts 147 to the wall 149 of laterally disposed desk structures 151 which may be, for example, drawer pedestals of a desk. These pedestals may include angle shaped gusset members 153 disposed at the respective lower corners of the pedestals and secured at least to the walls 149 by the screws 145 and nuts 147 as shown in FIG. 14. The panel 135 is formed of sheet material and along its lower edge may be bent as at 155 in circular contour about the rod 139 to form a pivotal connection with said rod, so that the panel 135 may be pivotally moved from the full line vertical position in FIG. 13 to the dotted line position shown in this figure which is in inclined relation to the vertical, and reversely to the full line position. In the embodiment disclosed the horizontal edge of the panel 135 is formed with a flange 157 disposed in the full line position just beneath the lower side of the desk top 137. Along the vertical side edges of the panel 135 vertical flanges 159 are provided to increase the rigidity of the panel. If desired this panel also may be constructed as is the panel 11, for example of FIGS. 3 and 4, to provide parallel panel walls defining a hollow panel.

Attached to each of the vertical walls 149 of the pedestals 151 is a bracket 161 which may be secured by welding or other suitable means. This bracket carries a stud 163 extending therefrom generally parallel to the rod 139. Pivotally connected at 165 to the vertical flange 159 of the panel is a connecting bar 167 having a slot 169 extending therealong of such width as to receive the stud 163 to provide for movement of the connecting bar between the full line position of FIG. 13 and the dotted line position, the stud becoming disposed adjacent the opposite ends of the slot 169 in this movement. At the end of the stud 163 if desired a fastening means, not shown, may be disposed for engagement with the connecting bar 167 to hold this bar in position for any disposition of the bar with respect to the stud 163 to dispose the panel 135 in different inclined positions.

In the embodiment disclosed the bracket 161 also is provided with a reverted portion 171 having an opening 172 therein through which the bar 167 may move in the movement between the full line and the dotted line positions thereof in FIG. 13. This reverted portion thus prevents disengagement of the bar from the stud. The end 173 of the bar is bent over to prevent this end from passing completely through the opening 172.

As shown in FIG. 13 at the forward face of the panel 135 is provided an element 174 which may be formed of sheet material and secured as by welding to the forward face of the panel 135. The element 174 is formed with an upper portion 175 of curved contour adapted to receive the hook 177 of a waste basket or container 179 of suitable form for disposition in the space between the pedestals 151 and beneath the desk top 137. Having regard to the weight of the container 179 when in place on the element 174, it will be understood that the panel 135 is generally biased toward the vertical full line position of FIG. 13. When, however, the panel 135 is moved to the dotted line position the weight of the composite structure becomes disposed at the right of the vertical through the pivotal axis in FIG. 13 and the bar 167 becomes biased so that the left hand end of the slot 169 engages the stud 163 or the bent over end 173 of the bar engages the reverted portion 171 of the bracket 161 to prevent falling of the panel and the waste container further downwardly. The waste material then may be readily removed from the container by a person standing at the rear of the desk. After such removal, by merely pushing the panel upwardly to the vertical full line position, the panel will be biased to remain in this vertical position. The hook 177 provides for removal of the container from the panel when desired.

It will be understood that the structure may be such, having regard to the weight of the bar 167 which is pivotally connected to the panel 135, that the panel may be biased to remain in the vertical position even though the waste container were removed from the supporting element 174.

Although in this embodiment the waste container as shown in FIG. 12 is of shorter length and has a hook portion 177 shorter than the curvilinear portion 175 of the element 174, these dimensions may be modified, if desired, so that the waste container extends more nearly over the full length of the space between the pedestal 151. The hook portion 177 also may extend generally over a greater portion of the length of the element 174.

Within the scope of the invention the form and dimensions of the parts may be modified. Instead of utilizing desk legs that are of square cross section as shown for the tubes 65, these tubes may be of rectangular section of unequal dimensions for the sides of the rectangle. Instead of the channel elements 69 that are disposed within the rectangular tubes 65, a reinforcing member of differ-

ent section may be used but it is found, by using a channel element within a rectangular tube, especially within a tube of square section, that the requisite strength and rigidity as well as the provision of a wall thickness sufficient for forming the hubs 75 on the channel elements may be secured with less cost than when other combinations of the structural parts are utilized for the construction of the legs of the desk.

Although the spacers 91 or the equivalent angle members 95 acting as spacers are shown in connection with the embodiment of the desk construction described and shown in the drawings, if desired these spacers may be omitted and the shoulder formed between the shank 81 of the stud 70 and the threaded part 71 thereof may engage the outer surface of the tube 65 which is disposed adjacent the end wall of the panel or adjacent a wall of the drawer pedestal. Within the scope of the invention also the stud may be secured directly in the wall of the tubular member of the desk leg with or without the disposition of a channel element within the space defined by the walls of the tubular member.

For clearer understanding of the terms utilized in the claims it is to be understood that the wall of the panel, particularly the wall that is disposed transverse to the main wall of the panel providing its broad surface extent, may comprise broadly one or more of the laminated sheet material portions, or one or both of the flanges 47, 51 of the panel, or may comprise the strip or plate 53 and the adjacent flanges 47, 51 that are disposed in engagement with each other as shown and described. The keyhole opening which in the embodiment described is formed in the plate 53 broadly may be formed in such a wall or transverse wall of the panel, so that a stud secured in a member of the furniture construction disposed adjacent the panel may engage the wall of the panel in which the keyhole opening is disposed so as to function in the manner which has been described for the keyhole in the plate 53.

Although in the embodiments shown in the drawings the head 83 of the stud is of circular outline adapted to pass through the enlarged circular part of the keyhole opening 55, the shank 81 of the stud also being of circular section, within the scope of the invention these parts of the stud may be of different form. For example, the head of the stud may be rectangular and the enlarged part of the keyhole opening may be of rectangular outline instead of circular. In using the term "keyhole opening," therefore, it will be understood that it is not limited to the particular conventional form of a keyhole in which the enlarged portion ordinarily is circular.

The sheet material which is utilized for constructing the panel and the pedestal of the desk of the invention as disclosed preferably is sheet steel which may be enameled or otherwise finished at the exterior or exposed surface thereof. Other sheet materials, however, may be utilized which provide sufficient strength in the panels and pedestals as constructed to maintain the form of the panel and the pedestal as well as to cooperate with the studs and the supporting members of the furniture construction. Preferably the desk legs as disclosed will be made of steel tubes of rectangular section and channel elements therewithin. The hubs provided by the channel elements may be formed by upsetting a portion of the material inwardly and thereafter threading the opening which concomitantly is formed in the web or flange of the channel element. Ordinarily also the studs will be made of suitable steel fabricated by conventional machining operations. Other sheet materials and tubular and channel materials which are capable of providing proper forms and strength and rigidity may be utilized to provide the features of the invention which have been described.

When the panels are of sheet steel the thickness of the sheet may be, for example, 18 gauge but this thickness may be generally in the range between 16 and 20 gauge for furniture such as a desk. The thickness of the wall of the rectangular tubing may be approximately 1/16" with the thickness of the web and flanges of the channel element approximately 14 gauge. These thicknesses, however, may be varied substantially to suit different conditions in the furniture construction. The thickness of the strip or plate in which the keyhole opening is formed may be, for example, 16 gauge but this thickness may be varied, for example, substantially in the range between 14 and 18 gauge for a desk construction. The thickness of the spacer may be such as suitably to produce a recess for securing the desired design effect in the assembly with the panel or the pedestal. This thickness, for example, may be of the degree of 1/8" for a desk construction and the legs of the angular member utilized at the rear corners of the desk each may be of similar thickness to that of the flat spacer used at the forward corners of the desk.

It will be understood further that in the claims the wall of the rectangular leg of the desk or similar support wall may be that of the tube alone or may include a reinforcement, such as the wall of the channel element. It also may include the spacer or both the channel element and the spacer.

The space within the hollow panels between the parallel panel walls thereof may contain a sound insulating material 185, as shown by way of example in fragmentary section for the panel 23 in FIG. 4. This insulation may serve not only to limit or eliminate the transmission of and sympathetic response to sound waves which may produce vibration in the desk but may serve also to prevent mechanical movement of the parallel panel walls with respect to each other inwardly of the panel and to resist bending or denting thereof. This material also, if desired, may be such as to add sufficient weight to the panel to aid in holding the panel downwardly where the slot portion of the keyhole opening is disposed upwardly as shown in FIG. 8, the shank 81 of the stud being disposed at the upper end of the slot in the assembled position of the panels and desk legs. For such purposes also the insulating material may be made in the form of a board of such thickness and lineal dimensions as will provide for fitting the board within the hollow panel prior to the assembly of the two panel walls thereof, or after such assembly by inserting the board through one edge of the panel before closing this edge by forming the flanges.

The variations and modifications which have been referred to and others may be made within the scope of the invention while providing the features which have been described and which are claimed in the appended claims.

I claim:

1. In a furniture construction the combination with a panel having a panel wall and a wall disposed transversely of said panel wall along an edge of the panel, of an elongated member extending along and adjacent a given one of said walls of said panel, said elongated member providing an exterior surface generally parallel to the exterior surface of said given wall and providing an exterior surface transverse to said parallel surfaces, said given wall of said panel being provided with a keyhole opening therethrough, a stud secured to said member and extending outwardly of said exterior surface of said elongated member that is parallel to said exterior surface of said given wall, said stud providing an enlarged head having a diameter for passing said head through the enlarged part of said key-hole opening and for engaging the portion of said given wall of said panel along the slot of said key-hole opening with a portion of said stud between said head and said elongated member disposed in said slot of said key-hole opening, and a spacer having opposite surfaces and disposed between and with said opposite surfaces respectively engaging the exterior surface of said given panel wall and the adjacent exterior parallel surface of said elongated member, at least one edge of said spacer being disposed inwardly

of said transverse surface of said elongated member to form along said member a recess open adjacent said transverse surface and between said member and said panel, said spacer being provided with an opening for receiving a portion of said stud between said head thereof and said elongated member.

2. In a furniture construction the combination as defined in claim 1 in which said given wall is an end wall of said panel disposed transversely of said panel wall.

3. In a furniture construction the combination as defined in claim 1 in which said stud is provided at the end thereof opposite to said head with a portion of less diameter than and forming a shoulder with an intermediate portion of said stud extending between said head and said spacer, said intermediate portion being of less diameter than said head, said shoulder being in bearing relation to said spacer, and means for securing said end portion of said stud to said elongated member.

4. In a furniture construction the combination as defined in claim 1 in which said stud has a shank adjacent said head and a portion spaced from said head and of less diameter than and forming a shoulder with said shank, said spacer being provided with an opening for receiving said portion of less diameter than said shank with said shoulder bearing against said spacer to secure said spacer to said elongated member.

5. In a furniture construction the combination as defined in claim 4 in which said spacer is secured to said elongated member so as to be removable therewith and with said stud.

6. In a furniture construction the combination as defined in claim 1 in which said elongated member comprises a tube of rectangular cross section transversely of its length and providing a rectangular space defined within the annulus of said tube, and means securing said stud to the wall of said tube and extending therefrom at the side thereof providing said exterior surface that is generally parallel to the exterior surface of said transverse wall of said panel.

7. In a furniture construction the combination as defined in claim 6 which comprises an element of channel section disposed within the hollow space of said tube of rectangular cross section and secured to said tube in engagement with the interior surfaces of the walls of said tube for reinforcing the walls of said tube.

8. In a furniture construction the combination as defined in claim 1 in which said elongated member comprises a tube of rectangular cross section transversely of its length and providing a rectangular space defined within the annulus of said tube, a given face of said tube providing said exterior surface of said elongated member parallel to the exterior surface of said given wall of said panel, said tube being provided at said given face thereof with an opening through the wall thereof, means disposed within said rectangular space of said tube and providing a hub extending inwardly of the tube with respect to said face of said tube and about an opening aligned with said opening of said wall of said tube, said stud at the end thereof opposite to said head thereof being formed with a threaded portion of less diameter than and forming a shoulder with a portion of the stud between said head thereof and said elongated member which is of less diameter than said head, the opening of said hub being threaded to receive said threaded end portion of said stud with said shoulder of said stud in bearing relation to said elongated member to secure said stud to said elongated member.

9. In a furniture construction and combination as defined in claim 1 in which said elongated member comprises a tube of rectangular cross section transversely of its length and providing a rectangular hollow space defined within the annulus of said tube, a given face of said tube providing said exterior surface of said elongated member parallel to said exterior surface of said given wall of said panel, an element of channel section disposed within said hollow space of said tube and secured thereto with the web and flanges thereof respectively in engagement with the interior surfaces of the adjacent walls of said tube, the web of said element of channel section being disposed adjacent the wall of said tube which provides said exterior surface of said elongated member that is parallel to said exterior surface of said given wall, said web of said channel element having an opening therethrough, and a hub extending inwardly into said space from said web and extending about an opening in alignment with said opening of said web, said wall of said tube which provides said exterior surface of said elongated member having an opening therethrough in alignment with said opening of said hub, said stud at the end thereof opposite to said head thereof being formed with a threaded portion of less diameter than and forming a shoulder with a shank portion of said stud between said head and said elongated member, said opening of said hub being threaded to receive the threaded portion of said stud with the shoulder of said stud in bearing relation to said spacer.

10. A desk construction comprising two panel members of sheet material each providing a vertically disposed panel wall and each provided along two opposite vertical edges thereof with flanges disposed transversely of said panel wall, the flanges of a given one of said panel members being disposed in inverted relation to and between the flanges of the other panel member and with the exterior surfaces of the flanges of said given panel member in lapping engagement respectively with the interior surfaces of the flanges of said other panel member, means securing said panel members together to form a hollow panel with said panel walls in spaced generally parallel relation to each other, a plate disposed within the hollow space of said panel and extending along and engaging the inner surface of the inner flange of at least one edge of said panel, said plate providing an opening therethrough formed with an enlarged first portion and a second portion of restricted width with respect to and open into said first portion, a vertically disposed elongated member adjacent the exterior surface of said edge of the panel at which said plate is disposed, a stud secured to and extending transversely of said elongated member and provided with an enlarged head spaced along said stud from said elongated member and adapted to pass through said first portion of said opening of said plate so as to be disposed adjacent and at the inner side of said plate said stud having a shank portion adapted to be received in said second portion of said opening of said plate with said head of said stud in bearing engagement with said inner side of said plate for securing the edge portion of said panel to said elongated member.

11. A desk construction comprising a drawer pedestal, a hollow panel member having a vertically disposed panel wall and a transverse vertically disposed end wall, said transverse end wall being provided with a keyhole opening therethrough, a stud engaging a portion of said drawer pedestal and provided with an enlarged head spaced along said stud from said pedestal and adapted to pass through the enlarged part of said keyhole opening so as to be disposed adjacent and at the inner side of said transverse wall, said stud having a shank portion adapted to be received in the slot of said keyhole opening with said head of said stud in bearing engagement with said inner side of said transverse wall for securing the edge portion of said hollow panel to said pedestal, and a spacer disposed between said transverse wall and said pedestal, the edge of said spacer being offset inwardly with respect to the exterior faces of said panel and of said pedestal to provide a recess therebetween.

12. A desk construction having a drawer pedestal and a rear vertically disposed panel, said panel comprising two panel members of sheet material each providing a vertically disposed panel wall and each provided along

two opposite vertical edges thereof with flanges disposed transversely of said panel wall, the flanges of a given one of said panel members being disposed in inverted relation to and between the flanges of the other panel member and with the exterior surfaces of the flanges of said given panel member in lapping engagement respectively with the interior surfaces of the flanges of said other panel member, means securing said panel members together to form a hollow panel with said panel walls in spaced generally parallel relation to each other, plates disposed within the hollow space of said panel and respectively extending along and engaging the inner surfaces of said flanges of said panel, each plate providing a keyhole opening therethrough, and a stud secured to a portion of said drawer pedestal and provided with an enlarged head spaced along said stud from said pedestal and adapted to pass through the enlarged part of said keyhole opening of said plate so as to be disposed adjacent and at the inner side of said plate, said stud having a shank portion of less diameter than said head and adapted to be received in the slot of said keyhole opening with said head of said stud in bearing engagement with said plate for securing the edge portion of said hollow panel to said pedestal.

13. A panel construction for an article of furniture comprising two panel members of sheet material each providing a panel wall and each provided along an edge thereof with a flange disposed transversely of said panel wall, the flange of a given one of said panel members being disposed in inverted lapping relation to and engaging the inner side of the flange of the other panel member to form the edge portion of said panel, means securing said panel members together to form a hollow panel with said panel walls in spaced generally parallel relation to each other, a plate secured to said panel and disposed adjacent the inner side of the flange of said given panel to reinforce said edge portion of said panel, said plate being provided with an opening therethrough having an enlarged part to provide for passing the enlarged head of a stud carried by an adjacent member of said article of furniture, said opening having a part of restricted width with respect to and open into said enlarged part, the portions of said plate along said restricted part of said opening being adapted for receiving the bearing engagement of said head of said stud for securing said edge portion of said panel to said adjacent member of said article of furniture.

14. A panel construction for an article of furniture comprising two panel members formed of sheet material each providing a panel wall and each provided along at least two opposite edges thereof with flanges disposed transversely of said panel wall, the flanges of a given one of said panel members being disposed in inverted lapping relation to and between the flanges of the other panel member and with the exterior surfaces of the flanges of said given panel member in engagement respectively with the interior surfaces of the flanges of said other panel member, means securing said panel members together to form a hollow panel with said walls in spaced generally parallel relation to each other, a plate disposed adjacent the inner surface of a flange of said given member, said plate being provided with a keyhole opening therethrough, said flanges of said panel members that are adjacent said plate having an opening therethrough exposing the portion of said plate about said keyhole opening of said plate to provide for passing through the enlarged part of said keyhole opening and clear of said flanges the enlarged head of a stud carried by a member of the article of furniture disposed adjacent said flanges of said panel for engagement of said head of said stud with the portions of said plate at the inner side thereof along the slot part of said keyhole opening for securing said panel to said adjacent member of said article of furniture.

15. A panel construction for an article of furniture as defined in claim 13 which comprises insulating material disposed within the hollow space of said panel.

16. A panel construction for an article of furniture as defined in claim 15 in which said insulating material is in the form of a board having a thickness substantially to fill the hollow space within said panel between said panel walls thereof.

17. In a furniture construction the combination with a main structure having an exterior outline comprising two generally horizontal portions in angular relation to each other adjacent a corner of said structure, of an elongated upright disposed adjacent said corner of said main structure and having two vertical surfaces outwardly facing with respect to said structure and disposed respectively generally parallel to said two portions of said exterior outline of said main structure, an elongated spacer member having two portions disposed in angular relation to each other and extending lengthwise along and adjacent to said upright at the sides thereof respectively opposite to said outwardly facing vertical surfaces of said upright, said elongated spacer member being disposed with said lengthwise portions thereof between said upright and respectively adjacent portions of said main structure, the edges of said angularly related portions of said spacer member along the length thereof being disposed inwardly of said outwardly facing vertical surfaces of said upright so as to leave recesses extending along said upright between said upright and said main structure, and means securing said elongated spacer member and said upright to said main structure to provide for supporting said main structure with said elongated upright spaced by said recesses from said main structure.

18. In a furniture construction the combination as defined in claim 17 in which said spacer member is provided by an angle member having legs disposed at a right angle to each other, said elongated upright having a rectangular section transversely of its length providing said two outwardly facing vertical surfaces and two surfaces respectively opposite to said outwardly facing surfaces and facing inwardly with respect to said main structure, said inwardly facing surfaces being respectively adjacent the surfaces of said angle member that define the angular space between said legs of said angle member, the dimension of said legs of said angle member transversely of the length thereof being such as to dispose the lengthwise edges of said angle member in inwardly offset relation to the respective adjacent outwardly facing surfaces of said upright to form said recesses between said upright and said main structure of said furniture construction.

19. In a furniture construction the combination as defined in claim 17 in which said elongated upright is of square section transversely of its length, said elongated spacer member being of right angle section with the lengths of the legs thereof transversely of the length of and at the outside faces of said spacer member equal and substantially equal to the dimension of the side of said square so as to dispose the lengthwise edges of said angle member in inwardly offset relation to said lengthwise outwardly facing vertical surfaces of said upright.

20. In a furniture construction the combination as defined in claim 19 in which the thicknesses of the two legs of said angle spacer member are substantially equal to each other and substantially equal to the depth of said recesses with respect to said outwardly facing surfaces of said upright.

21. In a desk or similar article of furniture the combination with a main structure having a vertically extending corner, of an elongated upright disposed adjacent said corner of said main structure and having two angularly related vertical surfaces, an elongated spacer member having two lengthwise portions in angular relation to each other and extending along said spacer member, said upright extending along said elongated spacer mem-

ber and being disposed in the angular space between said two lengthwise portions of said spacer member with said two angularly related vertical surfaces of said upright outwardly facing with respect to said main structure and with said angularly related lengthwise portions of said elongated spacer member between said upright and respectively adjacent portions of said main structure, the edges of said angularly related lengthwise portions along the length of said spacer member being disposed inwardly of the respective outwardly facing adjacent vertical surfaces of said upright so as to leave recesses extending along said upright between said upright and said main structure, and means securing said elognated spacer member and said upright to said main structure and providing for supporting said main structure adjacent said corner thereof.

22. In a furniture construction the combination with a main structure having a vertical surface, of an elongated upright disposed adjacent said main structure and having a vertical surface disposed transversely of said vertical surface of said main structure, said upright having a vertical surface disposed adjacent and generally parallel to and in spaced relation to said vertical surface of said main structure, an elongated spaced member extending lengthwise along said upright and between said spaced parallel surfaces of said upright and said main structure, said spacer member having an edge along the length thereof disposed inwardly with respect to said transversely disposed vertical surface of said upright so as to leave a recess extending along said upright between said upright and said main structure, and means securing said elongated spacer member and said upright to said main structure.

23. A support for an article of furniture, comprising:

(*a*) an elongated tube of hollow rectangular cross-section and providing a space of rectangular cross-section within the tube;

(*b*) an elongated element of channel-shaped cross-section within said tube and extending substantially throughout its length, said element comprising a web and two flanges having external dimensions substantially equal to the internal dimensions of the tube to provide a snug sliding fit between the tube and the element with the web and flanges engaging three adjacent walls of the tube;

(*c*) securing means carried by said tube and element for engaging an adjacent member of said article of furniture and securing said support thereto, said securing means comprising a stud secured to said channel element and extending outwardly through and beyond the exterior face of a given wall of said tube, said stud having:

(1) an enlarged head spaced from said exterior face of said given wall;

(2) a shank portion of less diameter than said head disposed between said head and said tube; and

(3) said stud being adapted to engage a keyhole opening in said adjacent member of the article of furniture for securing said support thereto.

24. A support for an article of furniture, comprising:

(*a*) an elongated tube of hollow rectangular cross-section and providing a space of rectangular cross-section within the tube;

(*b*) an elongated element of channel-shaped cross-section within said tube and extending substantially throughout its length, said element comprising a web and two flanges having external dimensions substantially equal to the internal dimensions of the tube to provide a snug sliding fit between the tube and the element with the web and flanges engaging three adjacent walls of the tube;

(*c*) securing means carried by said tube and element for engaging an adjacent member of said article of furniture and securing said support thereto;

(*d*) said element having a hub extending inwardly of said rectangular space with respect to a wall of said element, said hub having an internally threaded opening therethrough transversely of said wall of said element;

(*e*) the wall of said tube adjacent to and in engagement with said wall of said element having an opening therethrough in alignment with said opening of said hub; and

(*f*) said securing means comprising a stud having a threaded portion threaded in said opening of said hub and extending transversely of and through said wall of said element outwardly with respect to the exterior surface of said adjacent wall of said tube to an enlarged head, said stud having a shank portion between said head and said exterior face of said tube, said shank portion forming a shoulder with said threaded portion of said stud and disposed in bearing relation to said support.

25. An elongated element as defined in claim 24, in which said wall of said element is the web thereof.

26. An elongated element as defined in claim 24, in which said wall of said element is a flange thereof.

27. A support for an article of furniture, comprising:

(*a*) an elongated tube of hollow rectangular cross-section and providing a space of rectangular cross-section within the tube;

(*b*) an elongated element of channel-shaped cross-section within said tube and extending substantially throughout its length, said element comprising a web and two flanges having external dimensions substantially equal to the internal dimensions of the tube to provide a snug sliding fit between the tube and the element with the web and flanges engaging three adjacent walls of the tube;

(*d*) said element having a hub extending inwardly of said rectangular space with respect to a wall of said element, said hub having an internally threaded opening therethrough transversly of said wall of said element;

(*e*) the wall of said tube adjacent to and in engagement with said wall of said element having an opening therethrough in alignment with said opening of said hub;

(*f*) a spacer member disposed in engagement with the exterior face of said adjacent wall of said tube and providing an outer surface generally parallel to said exterior face of said adjacent wall of said tube, said spacer member having an opening in alignment with said openings of said adjacent tube wall and of said hub;

(*g*) said securing means comprising a stud having:

(1) a threaded portion threaded in said opening of said hub and extending outwardly through said opening of said wall of said tube and through said opening of said spacer to an enlarged head; and

(2) a shank portion between said head and said outer surface of said spacer member, said shank portion forming a shoulder with said threaded portion of said stud and disposed in bearing relation to said outer surface of said spacer member for rigidly securing said stud and said spacer member to said tube and said channel element.

28. An elongated support as defined in claim 27, in which a lengthwise edge of said spacer is offset toward said stud upon said face of said tube.

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