(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number : **0 686 734 A2**

(12) EUROPEAN PATENT APPLICATION

(21) Application number : **95303970.8**

(51) Int. Cl.[6] : **E04B 2/74**

(22) Date of filing : **09.06.95**

(30) Priority : **10.06.94 US 258326**

(43) Date of publication of application :
13.12.95 Bulletin 95/50

(84) Designated Contracting States :
DE FR GB IT

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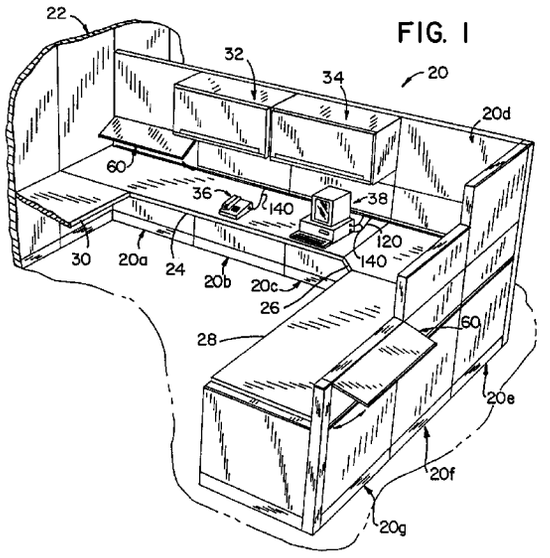
(54) Wall system

(57) A movable wall assembly consists of a series of interconnected wall sections, each of which is defined by a frame assembly to which a series of panels are removably mounted. The panels are mounted to the frame assemblies via a series of openings formed in the frame members and protrusions extending from the panels received within the openings. A locking strip is mounted to the frame members for movement between a locking position to selectively engage the protrusions to mount the panel to the frame assembly, and to a release position to disengage the protrusions to enable the panel to be removed from the frame assembly. An electrical power and voice/data communication distribution system is interconnected with the frame assembly, and includes electrical power receptacles located within an internal cavity defined between the wall panels. The receptacles face at least partially downwardly, and are accessible through an access opening. The cables extend from electrical equipment supported by a worksurface adjacent the wall assembly, and the excess portion of the cable hangs downwardly from the receptacle to efficiently and conveniently store the excess cable. Preferably, a portion of the receptacle faces the access opening to provide visibility of the receptacle when connecting a cable thereto.

FIG. 1



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This invention relates to a movable wall system such as for use in an office environment, and more particularly to a modular wall system having power and voice/data communication distribution, and in which the wall system is made up of a series of interconnected frames to which wall panels are releasably mounted.

Open plan office environments are commonly utilized. Environments of this type typically employ a wall system which can be reconfigured to different arrangements as desired. Components such as worksurfaces and storage cabinets mounted to the wall panels to construct a workstation. The panels and components can be changed to different locations and configurations relatively easily in order to provide flexibility in the overall arrangement of the open plan environment.

It is an object of the present invention to provide an improved panel mounting system for releasably securing wall panels to the frames of a wall assembly. It is a further object of the invention to provide such a panel mounting system which is simple in its construction and operation, yet which provides highly satisfactory removable mounting of the wall panels to the frames. A further object of the invention is to provide an improved electrical power and voice/data communication distribution arrangement incorporated into the wall assembly, which simplifies connection of cables, extending from electrical devices supported by the worksurface, to the distribution system.

The invention is adapted for use in connection with a wall assembly having a series of side-by-side frames, each of which is defined by interconnected frame members.

In accordance with one aspect of the invention, a system for mounting a panel to a wall assembly includes one or more openings formed in a mounting surface of one or more of the frame members, with the openings facing the panel, and one or more protrusions provided on a rearward surface of the panel facing the mounting surface of the frame member. The one or more protrusions are adapted to extend through the one or more frame member openings. A locking member is movably mounted to the frame member for movement between a locking position in which the locking member prevents the one or more protrusions from being removed from the frame member openings to secure the panel to the frame member, and a release position in which the locking member provides removal of the protrusions from the openings to enable the panel to be removed from the frame member. The locking member in its locking position engages the protrusions to prevent removal of the protrusions from the frame member openings, and in its release position is disengaged from the protrusions. The locking member is movable between its locking and release positions via a manually accessible portion, preferably disposed within an open end defined by the frame member. The frame member preferably extends substantially vertically, and terminates in an open upper end within which the manually accessible portion of the locking member is located.

In a preferred form, the locking member is slidably mounted to the frame member, and is manually movable upwardly to its release position and is biased downwardly by gravity toward its locking position. The locking member includes an opening movable into alignment with the frame member opening when the locking member is in its release position to enable the protrusion to be passed through the aligned frame member and locking member openings, and movement of the locking member to its locking position engages an edge of the locking member opening with the protrusion to prevent removal of the protrusion from the frame member opening. A series of spaced openings are preferably formed in the frame member, and each is capable of receiving a protrusion. Likewise, the locking member preferably includes a series of openings in locations corresponding to the locations of the frame member openings. With this arrangement, the panels can be quickly and easily mounted to an dismounted from the frame members to facilitate rapid interchangeability of the panels.

This aspect of the invention further contemplates a method of releasably mounting a wall panel to a frame member in a wall system, substantially in accordance with the foregoing summary.

In accordance with another aspect of the invention, the wall defines an internal cavity, and a frame member is disposed within the internal cavity such that at least a portion of the internal cavity is located below the frame member. A movable access arrangement is interconnected with the wall for providing selective access to the internal cavity and the frame member through an access opening in the wall. A power receptacle is mounted to the frame member and is oriented so as to at least partially face the portion of the internal cavity located below the frame member, such that a power cable engaged with the receptacle through the access opening hangs downwardly into the internal cavity below the support member. The power receptacle is also preferably mounted to the frame member such that at least a portion of the receptacle faces the access opening, to provide visibility of the power receptacle when engaging the power cable therewith. In one form, the frame member includes an angled wall which faces the access opening, and the receptacle is mounted to the angled wall. In another form, the frame member includes an opening, and the power receptacle is mounted to an insert engaged within the frame member opening. The insert includes an angled wall which faces the access opening, and the power receptacle is mounted to the angled wall. With this construction, the insert can be oriented such that the angled wall faces either side of

the wall assembly, so that the power receptacle can be angled toward either side of the wall if the internal cavity is accessible from either side of the wall. A power cable extending from an electrical device supported by a worksurface adjacent the wall can thus be fed downwardly into the internal cavity through the access opening, and the plug of the power cable is engaged with the power receptacle in an upward direction. This arrangement conveniently takes advantage of gravity to store the portion of the power cable between the access opening and the plug in the internal cavity below the frame member.

This aspect of the invention further contemplates a power distribution method for a wall assembly, substantially in accordance with the foregoing summary.

The above-summarized aspects of the invention can satisfactorily be utilized separately to enhance construction and operation of a wall assembly. Preferably, however, these aspects of the invention are utilized in combination to construct an efficient and easily operable movable wall assembly.

Various other features, objects and advantages of the invention will be made apparent from the following description taken together with the drawings.

The drawings illustrate the best mode presently contemplated of carrying out the invention.

In the drawings:

Fig. 1 is a partial isometric view illustrating a workstation utilizing the movable wall assembly of the invention;

Fig. 2 is an exploded isometric view showing one section of the movable wall of Fig. 1 and showing the panels on one side of the section removed from the frame assembly;

Fig. 3 is a partial isometric view illustrating the electrical power and voice/data communication distribution system for a section of the movable wall assembly of Fig. 1;

Fig. 4 is a partial section view through a portion of the wall of Fig. 1, showing the electrical power and voice/data communication distribution system and engagement of a series of cables therewith;

Fig. 5 is a partial section view showing the panel mounting aspect of the invention for releasably mounting the wall panels to the frame assembly;

Fig. 6 is a partial section view taken along line 6-6 of Fig. 5;

Fig. 7 is a partial section view showing a connection arrangement for interconnecting adjacent sections of the wall assembly of Fig. 1;

Fig. 8 is a partial isometric view, with portions broken away, showing a post assembly provided at a right-angle corner defined by adjacent wall sections in the wall assembly of Fig. 1;

Fig. 9 is a partial top plan view showing engagement of a cover member with a post frame member of the post assembly of Fig. 8;

Fig. 10 is a partial side elevation view showing engagement of the cover member with the post frame member;

Fig. 11 is a partial side elevation view showing the cover member and post frame member of Fig. 10 prior to engagement;

Fig. 12 is a partial section view taken along line 12-12 of Fig. 8;

Fig. 13 is a partial section view, somewhat similar to Fig. 4, showing an embodiment of the electrical power and voice/data communication system in which the receptacle is angled toward the access opening;

Fig. 14 is a partial side elevation view showing inserts, to which the receptacles are mounted, including angled walls which face in opposite directions in order to provide visibility of the receptacle from either side of the wall;

Fig. 15 is a partial exploded isometric view of the insert assembly of Fig. 14;

Fig. 16 is a partial section view showing an alternative embodiment for an insert defining angled walls which face in opposite directions to provide visibility of the receptacles from either side of the wall; and

Fig. 17 is a partial section view showing yet another embodiment for providing visibility of the receptacle from the access opening.

Referring to Fig. 1, a movable wall assembly, shown generally at 20, is interconnected with a wall assembly 22 to define a work area, such as in an open plan office environment. Wall assembly 22 may be that such as is manufactured by Krueger International, Inc. of Green Bay, Wisconsin under its designation SYSTEMSWALL.

Wall assembly 20 is constructed of a series of wall sections, shown at 20a, 20b, 20c, 20d, 20e, 20f and 20g. Sections 20a-20g are similarly constructed, in that each generally consists of a frame assembly to which a series of panels are removably mounted, in a manner to be explained.

Worksurfaces 24, 26 and 28 are mounted to wall assembly 20, and a worksurface 30 is mounted to wall assembly 22. Overhead storage cabinets 32 and 34 are mounted to wall sections 20b and 20c, respectively, of wall assembly 20. Worksurfaces 24-30 are adapted to support a variety of devices requiring electrical power and/or voice or data communication, such as a telephone 36 and a computer system 38 including a CPU, a monitor and a keyboard.

Fig. 2 illustrates the components of wall assembly sections 20a-20e. The construction of sections 20a-20e as illustrated and as will be described is understood to be representative, in that other wall sections are similarly constructed and other wall section heights and panel arrangements could be employed.

As shown in Fig. 2, a frame assembly 40 consists of a pair of vertical frame members 42, 44, upper and

lower cross-members 46, 48, respectively, and an intermediate cross-member 50 (Fig. 3) flanked by a pair of intermediate vertical raceway walls 52, 54 (Fig. 2). Intermediate cross-member 50 is a non-structural member which functions to support the electrical and data communication componentry, in a manner as will be explained.

A wall panel 56 and a wall panel 58 are mounted to each side of frame assembly 40, and a movable access panel 60 is located between each set of panels 56, 58. While panels 56 and 58 are illustrated as being of substantially equal height, it is understood that panels 56 and 58 could vary in height from each other according to the height of frame assembly 40. Further, it is understood that panels 56 and 58 could be replaced with several panels of lesser height, depending upon architectural requirements of the end user.

In Fig. 2, access panel 60 is shown as being separate from upper panel 56 and frame members 42, 44. In a preferred form, however, access panels 60 are hingedly mounted, either directly to frame members 42, 44 or to the lower end of upper panel 56, such that access panels 60 are pivotable between a closed position, shown in Fig. 1 with respect to panels 20b-20f, and an open position as shown with respect to panels 20a and 20g. Access panels 60 in their open position provide access to an internal cavity adjacent and below intermediate frame member 50 through an access opening to enable a user to connect equipment such as telephone 36 and computer system 38 to a power and voice/data communication distribution system located within the internal cavity of the wall section, in a manner to be explained.

Figs. 2, 5 and 6 illustrate the manner in which wall panels 56, 58 are mounted to frame assembly 40. As shown in Fig. 2, a mounting wall of each of frame members 42, 44 includes a series of equally spaced rectangular openings 62, extending vertically along a common longitudinal axis substantially throughout the full height of frame members 42, 44. Openings 62 are also formed in opposite mounting surfaces of frame members 42, 44 for mounting the opposite pair of panels 56, 58 thereto.

Protrusions 64 are provided at the ends of panels 56, 58 on the rearward surface of each panel. Protrusions 64 are horizontally spaced apart a distance corresponding to the horizontal distance between openings 62 in frame member 42 and openings 62 in frame member 44. In the construction illustrated in Fig. 2, protrusions 64 are vertically spaced apart so as to be engageable with every second or third one of openings 62. It is understood, however, that any vertical spacing of protrusions 64 could be employed, as desired, to engage any desired number of openings 62.

As shown in Fig. 5, protrusions 64 extend through openings 62 formed in the mounting walls of frame members 42, 44 facing panels 56, 58. Frame members 42, 44 are tubular, and a locking strip 66 is mounted adjacent the inner surface of each mounting wall of frame members 42, 44 behind openings 62. As shown in Fig. 5, locking strip 66 is movable between a locking position, shown in solid lines, and a phantom line release position. Locking strip 66 is retained in position relative to the panel mounting wall of frame members 42, 44 via a retainer strip 68 having a pair of end flanges 72 secured such as by welding or the like, to the side walls of frame members 42, 44, and having openings 72 aligned with openings 62 formed in the mounting walls of frame members 42, 44. With this construction, locking strip 66 is sandwiched between retainer strip 68 and the mounting wall of frame member 42, 44, and is vertically movable between its locking and release positions. Screws, such as 74, are mounted to retainer strip 68, and the heads 76 of screws 74 are disposed within 78 formed in locking strip 66. Screws 74 are stationary, and engagement of screw heads 76 with the ends of slots 78 controls the range of vertical movement of locking strip 68 between its locking and release positions.

Locking strip 66 includes a horizontal upper flange 80, which is accessible through the open upper ends of frame members 42, 44, for providing manual engagement of flange 80 by a user to raise locking strip 66 to its release position. Locking strip 66 is preferably biased downwardly toward its locking position by gravity to return locking strip 66 to its locking position from its release position when manual engagement of flange 80 is released. Locking strip 66 includes a series of aligned vertical openings 81, each of which is located correspondingly to mounting wall openings 62 and retainer strip openings 72. Each opening 81 is offset vertically below openings 62, 72 when locking strip 66 is in its locking position, and is in alignment with openings 62, 72 when locking strip 66 is in its release position.

Each protrusion 64 is defined by a pair of mirror-image L-shaped members connected together. The lower leg of each L-shaped member is connected via a screw 82 to the frame of panel 56, so as to extend rearwardly therefrom. The rearwardly extending legs of each L-shaped member each define a distal point at the intersection of angled edges 84, 86; a retainer defined by an angled edge 88 extending downwardly and forwardly from the upper end of edge 84; a lower tab defined by an edge 90 extending forwardly from the lower end of edge 86 and an angled shoulder 92; and upper and lower parallel edges 94, 96 extending forwardly from the lower end of edge 88 and the upper extent of shoulder 92, respectively.

In operation, panel 56 is mounted to frame members 42, 44 by first positioning panel 56 in its phantom line position of Fig. 5, in which protrusions 64 are spaced from the mounting walls of frame members 42, 44. Locking strip 66 is maintained by gravity in its locking position. Panel 56 is then moved rearwardly toward frame members 42, 44, such that each protru-

sion 64 is inserted into one of openings 62 formed in the mounting walls of frame members 42, 44. A rearward force is then continued to be exerted on panel 56, such that the point defined by divergent edges 84, 86 is inserted through locking strip opening 81 and edge 84 engages the upper edge of locking strip opening 81. Continued rearward movement of panel 56 results in the upper edge of locking strip opening 81 riding upwardly along edge 84 to its phantom line release position, until the point defined by the intersection between edges 84 and 88 passes completely through locking strip opening 81, as shown in Fig. 5. Once all protrusions 64 have attained their Fig. 5 position by rearward movement of panel 56 toward frame members 42, 44, locking strip 66 returns by gravity to its locking position as shown in solid lines in Fig. 5. In this position, the upper edge of each locking strip opening 81 engages each protrusion 64 at the intersection between edges 88 and 94, with the portion of protrusion 64 thereabove acting as a retainer to maintain engagement between protrusion 64 and locking strip 66 and thereby between panel 56 and frame member 42, 44. The upper extent of shoulder 92 is engaged with the lower edge of retainer strip opening 72, and protrusion lower horizontal edge 96 rests on the lower edges of retainer strip opening 72 and frame member opening 62. With this construction, panel 56 cannot be pulled outwardly relative to frame members 42, 44 due to engagement of locking strip 66 with the upper extent of protrusion 64. When it is desired to remove panel 56 from frame members 42, 44, the user manually lifts locking strip 66 to its release position using flange 80, thus aligning locking strip openings 81 with frame member openings 62 and retainer strip openings 72. Protrusion 64 can then be withdrawn from the aligned openings to enable panel 56 to be removed from frame members 42, 44. The rearward angle of shoulder 92 facilitates removal of protrusion 64 by riding on the lower edges of retainer strip opening 72 and frame member opening 62 during removal of panel 56.

The above description and the drawings illustrate frame member openings 62, protrusions 64 and locking strip 66 in the context of mounting a wall panel to a frame. It is understood, however, that protrusions 64 could be mounted to any component or other device desired to be mounted to frame 44 for providing quick and easy interchangeable mounting of such components with wall panels and with each other.

As shown in Figs. 1 and 2, an extruded cap member 98 is releasably engageable with upper frame cross member 46 for providing selective access to the upper ends of frame members 42, 44 when it is desired to mount or remove panels 56, 58 from frame assembly 40. The length of cap member 98 is dependent upon the number of aligned wall sections to be spanned by cap member 98. As shown in Fig. 1, a single length of cap member 98 extends across wall sections 20a-20d, and cap member 98 also may span only a single wall section, such as 20e, 20f or 20g.

Figs. 3 and 4 illustrate the electrical power and voice or data communication distribution system for wall assembly 20. Intermediate frame member cross-member 50 extends between vertical frame members 42 and 44, and is connected to frame members 42, 44 via angle connectors, such as 100, and the electrical power and voice/data communication distribution system is mounted to cross-member 50.

The electrical power distribution system includes a wall section electrification assembly 102 and an electrical power bridging assembly 104. Electrification assembly 102 includes a flexible electrical conduit 106 which houses any satisfactory number of electrical power wires in any desired configuration, and connectors 108 mounted to the ends of conduit 106. Each of connectors 108 is secured to cross-member 50 in any conventional manner, such as by screws or the like, so as to fix electrification assembly 102 to frame assembly 40. Power receptacles, such as 110, are mounted within openings, such as 112, formed in intermediate cross-member 50. Each receptacle 110 includes a connector portion 114, which is adapted for engagement with a mating connector portion 116 on connector 108. Conventional mating terminals are provided on connector portions 114, 116, for providing electrical power from connectors 108 to receptacles 110. Receptacles 110 include conventional passages for receiving the prongs of plugs, such as 118, at the ends of power cords or cables 120 which, as illustratively shown in Fig. 1, may extend from an electrical device, such as computer system 38, located adjacent wall assembly 20. In this manner, electrical power is supplied through cables 120 to such devices located adjacent wall assembly 20.

A brush assembly 21 (Fig. 4) is mounted to the lower end of each access panel 60, for accommodating passage of cables 120 through a space defined between the lower end of each access panel 60 and the upper end of each lower panel 58.

Referring to Fig. 4, intermediate frame member 50 is located at approximately the center of the access opening enclosed by access panel 60, and the lower end of access panel 60 is located slightly above the upper surfaces of worksurfaces 24-28. With this arrangement, access panel 60 is pivoted to its open position to gain access to receptacles 110, and power cable plugs 118 are engaged with receptacles 110 in a conventional manner by exerting a vertically upward force on plugs 118 to insert the plug prongs into the passages of receptacles 110. The excess portions of cables 120 are then fed into the internal cavity, shown at 122 (Fig. 4), of the wall assembly between panels, and hang downwardly below frame member 50 and receptacles 110. This solves a significant problem in the prior art, in which electrical receptacles

in movable wall assemblies face upwardly and the excess portion of electrical cables must be forced into the cavity above the electrical receptacle. Allowing the electrical cable 120 to hang downwardly makes it much simpler and easier to engage the electrical cable plug with the receptacle, and to accommodate excess cable.

As shown in Fig. 3, bridging assembly 104 includes a flexible conduit 124 having a pair of connectors 126 at its ends. Each connector 126 is engageable with a connector 108 of the wall section electrification assembly 102, to communicate electrical power from one wall section to an adjacent wall section. Conduit 124 extends through openings 128 formed in the side walls of frame members 42, 44, to enable bridging connectors 104 to span between adjacent wall sections. With this arrangement, electrical power is maintained just above the worksurface of the workstation, to efficiently distribute electrical power throughout the worksurface area and to provide numerous locations at which various electrical devices can be connected to receptacles 110. Bridging assembly 104 may have a length sufficient to span any number of wall sections, in the event receptacles 110 are to be mounted to only selected ones of wall sections 20a-20g.

In addition, electrical power can be distributed along the bottom of each wall section 20a-20g, in accordance with conventional construction as embodied in movable wall assemblies such as are available from Krueger International, Inc., the assignee of the present application, under its designations SYSTEM XXI or SYSTEM 3000.

Voice and/or data communication receptacles, such as 132, are mounted within openings such as 134 formed in intermediate frame cross-member 50. Communication cables 136 extend downwardly through the upper portion of the wall section internal cavity, and may be received within a trough defined by upper frame member 46 to allow such cables to extend throughout the length of the assembled wall sections. Voice/data communication jacks 138, which are interconnected with voice/data cables 140, are engageable with voice/data receptacles 132 in a conventional manner. Referring to Fig. 1, voice/data communication cables 140 may extend from devices, such as telephone 36 or computer system 38 supported by worksurfaces 24-30. As with power cable plugs 118, voice/data jacks 138 are engaged with receptacles 132 using a vertically upward insertion force, and cables 140 below jacks 138 hang downwardly into internal cavity 122 below frame member 50 to accommodate excess cabling.

Alternatively, it is understood that voice/data communication cabling may be housed within conduit 106 and interconnected with connectors 108, which would then either include or be interconnected with voice/data communication jacks, such as 138. This arrangement provides highly efficient distribution of all cabling throughout the assembled wall sections.

Fig. 7 illustrates a mechanism for interconnecting adjacent panels, such as 20a-20g. As shown in Fig. 7, a pair of upper wedge connectors 142 are mounted toward the upper ends of adjacent frame members 42, 44 of any pair of adjacent wall sections 20a-20g, and a pair of lower wedge connectors 144 are mounted toward the lower ends of frame members 42, 44. Wedge connectors 142 and 144 are identical in construction, and wedge connectors 144 are inverted relative to wedge connectors 142. Wedge connectors 142 define angled surfaces 146, and wedge connectors 144 define angled surfaces 148.

Connector blocks 150 are employed to secure wedge connectors 142, 144 together to mount adjacent wall panels together along their side edges. Connector blocks 150 include a trough defined by angled walls 152, 154, which engage angled surfaces 146, 148 of wedge connectors 142, 144, respectively. Screws 156 extend through passages formed in connector blocks 150 and into engagement with threaded passages formed in wedge connectors 142, 144, with the head of each screw 156 engaging a shoulder defined by the passage formed in connector block 150. With this arrangement, turning screws 156 within the threaded passages in wedge connectors 142, 144 draws connectors blocks 150 toward wedge connectors 142, 144, and angled surfaces 146, 148 of wedge connectors 142, 144 ride on connector block angled walls 152, 154 to draw wedge connectors 142, 144 together to attain the connected position as shown at the lower end of frame members 42, 44 in Fig. 7.

Figs. 8-12 show a post assembly 158 for positioning at the intersection between right-angle wall sections, such as 20d and 20e. Post assembly 158 includes a base 160 having a screw 162 mounted to its upper surface and extending upwardly therefrom. Screw 162 is received within a threaded passage formed in a base mounting member 164, which is mounted to a right-angle vertical post frame member 166 to provide adjustability in the height of post assembly 158. Post frame member 166 includes right-angle walls 168, 170 to which base mounting member 164 is secured.

A post cover member 172, which includes a pair of right-angle walls 174, 176, is removably mountable to post frame member 166 in a manner to be explained.

A pair of openings 178, 180 are formed in post frame member walls 168, 170, and are at the same height as openings 128 in frame members 42, 44.

Referring to Figs. 9-11, the outer end of post frame member wall 170 includes an angled tab 182. An upwardly facing slot 184 is formed between tab 182 and wall 170. A similar tab and slot are formed at the lower end of wall 170, and pairs of similar tabs and slots are formed at the upper and lower ends of wall

168.

A tab 186 is formed at the upper end of post cover 158 at the outer end of wall 176, and a downwardly facing slot 187 is disposed between tab 186 and a connecting wall 188. A similar tab and slot are formed at the lower end of wall 176, and like pairs of tabs, such as shown at 190 (Fig. 8), and slots are formed at the upper and lower ends of wall 174, extending from a connecting wall 192. As shown in Figs. 10 and 11, slots 184 and 187 are aligned by moving post cover 174 toward post frame member 166. Post cover 172 is then moved downwardly until the ends of slots 184, 187 engage each other, wherein tab 182 engages tab 186 above slot 187 and tab 186 engages tab 182 below slot 184 to releasably mount post cover 172 to post frame member 166. Post assembly 158 thus defines an enclosed vertical passage 189 when cover 172 is secured to frame member 166. Post cover 172 is removed by reversing the above steps.

Preferably, walls 174 and 176 of post cover 172 are covered with a fabric matching the fabric covering of wall panels 56, 58, to provide a uniform appearance to wall assembly 20.

As shown in Fig. 12, openings 178, 180 enable cables, wires or conduits to pass between wall panels 20d and 20e. Also, the vertical passage 189 defined by post assembly 158 enables cables to extend in a vertical direction, such as between the desk-height power and voice/data communication distribution system and the upper and/or lower extent of the wall system.

Fig. 13 illustrates an alternative construction for the power and voice/data communication distribution system of Fig. 4. In the arrangement of Fig. 13, an insert 200 is engaged within an opening formed in intermediate cross-member 50. Insert 200 includes a distal wall 202 and a proximal wall 204 having a lesser height than that of distal wall 202. An angled wall 206 extends between the lower ends of distal and proximal walls 202, 204, respectively, and includes an opening within which a power receptacle assembly 208 is mounted in a conventional manner. Wall 206 is oriented so as to partially face the access opening enclosed by access door 60, in order to provide visibility to the cable-mounting portion, shown at 210, of receptacle assembly 208 when engaging plug 118 therewith. This construction provides the same advantage as that of Fig. 4, namely enabling cable 120 to hang downwardly into internal cavity 122 located between access doors 60 and lower panels 58. At the same time, the angle of wall 206 and thereby cable-mounting portion 210 of receptacle assembly 208 enables the user to view the passages formed in cable-mounting portion 210 within which the prongs of plug 118 are received.

Figs. 14 and 15 illustrates a pair of inserts 200 mounted within separate openings 212 formed in frame member 50. One of inserts 200 is mounted to frame member 50 such that its angled wall 206 faces rightwardly, and the other of inserts 200 is mounted to frame member 50 such that its angled wall 206 faces rightwardly. With this arrangement, one of receptacle assemblies 208 is positioned such that its mounting portion 210 partially faces and is visible from the rightward access opening enclosed by access door 60, and the other of receptacles 208 is oriented such that its cable-mounting portion 210 partially faces and is visible from the leftward access opening enclosed by access door 60.

Any satisfactory arrangement can be used to mount inserts 200 within openings 212 formed in frame member 50. As shown in Fig. 15, cam-type upwardly facing protrusions 214 may be formed on walls 202, 204, extending outwardly therefrom, and a downwardly facing cam-type protrusion 216 may be formed on walls 202, 204 between protrusions 214. This construction provides a snap-in system for mounting inserts 200 within openings 212 by engagement of the upwardly and downwardly facing surfaces of protrusions 214, 216, respectively, with the edges of frame member 50 adjacent opening 212. Receptacle 208 is snapped into an opening, shown at 218, formed in insert angled wall 206 in a conventional manner. While duplex receptacle assemblies 208 are illustrated, it is understood that any desired configuration of electrical receptacle may be mounted to insert 200.

Fig. 16 illustrates an alternative construction of an insert, shown at 220 engaged within an opening such as 212 formed in frame member 50. In this form, insert 220 defines a pair of side walls 222, 224 and oppositely angled walls 226, 228 extending therebetween. An opening is formed in each of walls 226, 228 for receiving a receptacle assembly 208 and orienting the receptacle mounting portions 210 thereof in opposite directions.

In the embodiments illustrated in Figs. 13-16, electrical power is communicated to receptacle assemblies 208 from a wall section power distribution assembly, such as 102 (Fig. 3) in a conventional manner.

Fig. 17 illustrates another embodiment for providing at least partial visibility of receptacle mounting portion 210 from the access opening. As shown in Fig. 17, frame member 50 is constructed such that one of its side walls, such as shown at 230, has a length longer than that of the opposite side wall, such as 232. An angled wall 234 extends from wall 230, and a receptacle assembly, such as 110 or 208, is mounted to angled wall 236. Angled wall 236 may be formed throughout the length of frame member 50, or alternatively may be formed on frame member 50 at discrete locations along its length.

Various alternatives and embodiments are contemplated as being within the scope of the following claims particularly pointing out and distinctly claim-

ing the subject matter regarded as the invention.

Claims

1. A panel mounting arrangement for a wall system which includes a frame having one or more frame members and one or more panels adapted to be mounted to the frame, comprising:

   one or more openings formed in a mounting surface of at least one of the frame members facing the panel;

   one or more protrusions provided on a rearward surface of the panel facing the mounting surface of the frame member and extending through the one or more openings; and

   a movable locking member mounted to the frame member for movement between a locking position in which the locking member prevents the one or more protrusions from being removed from the one or more openings to secure the panel to the frame member, and a release position in which the locking member provides removal of the one or more protrusions from the one or more openings to enable the panel to be removed from the frame member.

2. The panel mounting arrangement of claim 1, wherein the locking member in its locking position engages the one or more protrusions to prevent the one or more protrusions from being removed from the one or more openings, and wherein the locking member in its release position is disengaged from the one or more protrusions.

3. The panel mounting arrangement of claim 2, wherein the frame member defines an open end, and wherein the locking member includes a manually accessible portion extending into the frame member open end for manual access by a user to enable the user to move the locking member between its locking and release positions.

4. The panel mounting arrangement of claim 3, wherein the frame member to which the locking member is movably mounted extends substantially vertically and terminates in an upper end defining the frame member open end.

5. The panel mounting arrangement of claim 4, wherein the locking member is slidably mounted to the frame member and is mounted to the frame member so as to be manually movable upwardly to its release position and is biased by gravity downwardly toward its locking position.

6. The panel mounting arrangement of claim 2, wherein the locking member includes an opening movable into alignment with the frame member opening when the locking member is in its release position to enable the protrusion to be passed through the aligned frame member and locking member openings, and wherein movement of the locking member to its locking position engages an edge of the locking member defining the locking member opening with the protrusion to prevent removal of the protrusion therefrom.

7. The panel mounting arrangement of claim 6, wherein the frame member includes a series of spaced openings, each of which is capable of receiving a panel protrusion, and wherein the locking member includes a series of openings in locations corresponding to the locations of the frame member openings.

8. The panel mounting arrangement of claim 7, wherein the frame member openings extend along a common longitudinal axis, and wherein the locking member comprises an axially extending locking strip slidably mounted to the frame member for movement in a direction parallel to the longitudinal axis along which the frame member openings extend.

9. The panel mounting arrangement of claim 6, wherein each protrusion includes a retainer engageable with the locking member edge when the locking member is in its locking position to prevent removal of the protrusion from the frame member opening.

10. A releasable panel mounting arrangement for a wall system including a frame having a frame member and a removable member adapted to be mounted to the frame member, comprising:

    one or more protrusions provided on the removable member;

    a series of spaced openings formed in a mounting surface of the frame member, the openings extending along a longitudinal axis, wherein each opening is capable of receiving a protrusion; and

    a locking strip slidably mounted to the frame member and including a series of spaced openings extending along a longitudinal axis, wherein the locking strip is slidable relative to the frame member between a locking position and a release position;

    wherein the locking strip openings are in alignment with the frame member openings when the locking strip is in its release position to permit the removable member protrusions to be inserted into and removed from the aligned openings, and wherein movement of the locking strip to its locking position engages an edge of the locking strip

defining at least one of the locking strip openings with the protrusion to prevent removal of the protrusion from the frame member opening.

11. A method of releasably mounting a member to a frame in a wall system, the frame including a frame member, comprising the steps of:

providing one or more protrusions on a rearward surface of the removable member facing the frame member;

forming one or more openings in the frame member adapted to receive the one or more protrusions provided on the removable member;

mounting a movable locking member to the frame member;

inserting at least one of the removable member protrusions through at least one of the frame member openings to attain a mounting position for the removable member; and

moving the locking member relative to the frame member to prevent removal of the removable member protrusion from the frame member opening to releasably maintain the removable member in its mounting position.

12. In a wall assembly including an internal cavity, a frame member located adjacent the internal cavity such that at least a portion of the internal cavity is located below the frame member, and a movable access arrangement providing selective access to the frame member through an access opening in the wall, the improvement comprising a power receptacle mounted to the frame member and including a cable-mounting surface oriented so as to at least partially face downwardly toward the portion of the internal cavity located below the frame member, wherein a power cable engaged with the cable-mounting surface of the receptacle through the access opening hangs downwardly into the internal cavity below the frame member.

13. The improvement of claim 12, wherein the power receptacle is oriented such that at least a portion of the cable-mounting surface faces the access opening to provide visibility of the cable-mounting surface when engaging the power cable with the receptacle.

14. The improvement of claim 13, wherein the frame member includes an angled wall facing toward the access opening, and wherein the power receptacle is mounted to the angled wall.

15. The improvement of claim 13, wherein the frame member includes an opening, and wherein the power receptacle is mounted to an insert engaged within the frame member opening, wherein the insert includes an angled wall facing toward the access opening, and wherein the power receptacle is mounted to the angled wall of the insert to provide visibility of the cable-mounting surface when engaging a power cable therewith.

16. The improvement of claim 15, wherein the wall assembly defines spaced first and second sides between which the internal cavity is located, and wherein a movable access arrangement is associated with each side of the wall assembly to provide selective access to the frame member through access openings in both the first and second sides of the wall assembly, and wherein the insert is engageable with the frame member such that the insert angled wall is capable of facing toward the access opening in either the first or second sides of the wall assembly to provide visibility of the cable-mounting surface from either side of the wall assembly when engaging a power cable therewith.

17. A workstation system, comprising:

a wall system extending upwardly from a supporting surface and including a frame defining opposite sides and one or more panels engageable with the opposite sides of the frame to define an internal cavity therebetween;

a worksurface located above the supporting surface and adjacent the wall system;

an electrical power distribution system interconnected with the wall system frame and disposed within the internal cavity, and including one or more downwardly facing electrical receptacles for receiving the plug of an electrical cable extending from an electrical device supported by the worksurface, wherein the cable is received within the wall panel cavity below the receptacle; and

a movable access arrangement associated with the wall system and accessible from the worksurface for providing selective access to the one or more receptacles and for providing passage of the cable into the wall panel internal cavity from the worksurface.

18. A power distribution method for a wall assembly including an internal cavity, an access arrangement providing selective access to the internal cavity through an access opening, and a frame member disposed within the internal cavity such that at least a portion of the internal cavity is located below the frame member, comprising the steps of mounting a power receptacle to the frame member and orienting the power receptacle such that a cable-mounting surface defined by the receptacle faces downwardly to enable a power cable engaged with the receptacle through

the access opening to hang downwardly into the internal cavity below the frame member.

19. The method of claim 18, further comprising the step of orienting the receptacle such that at least a portion of the cable-mounting surface faces the access opening to provide visibility of the cable-mounting surface through the access opening when engaging a power cable therewith.

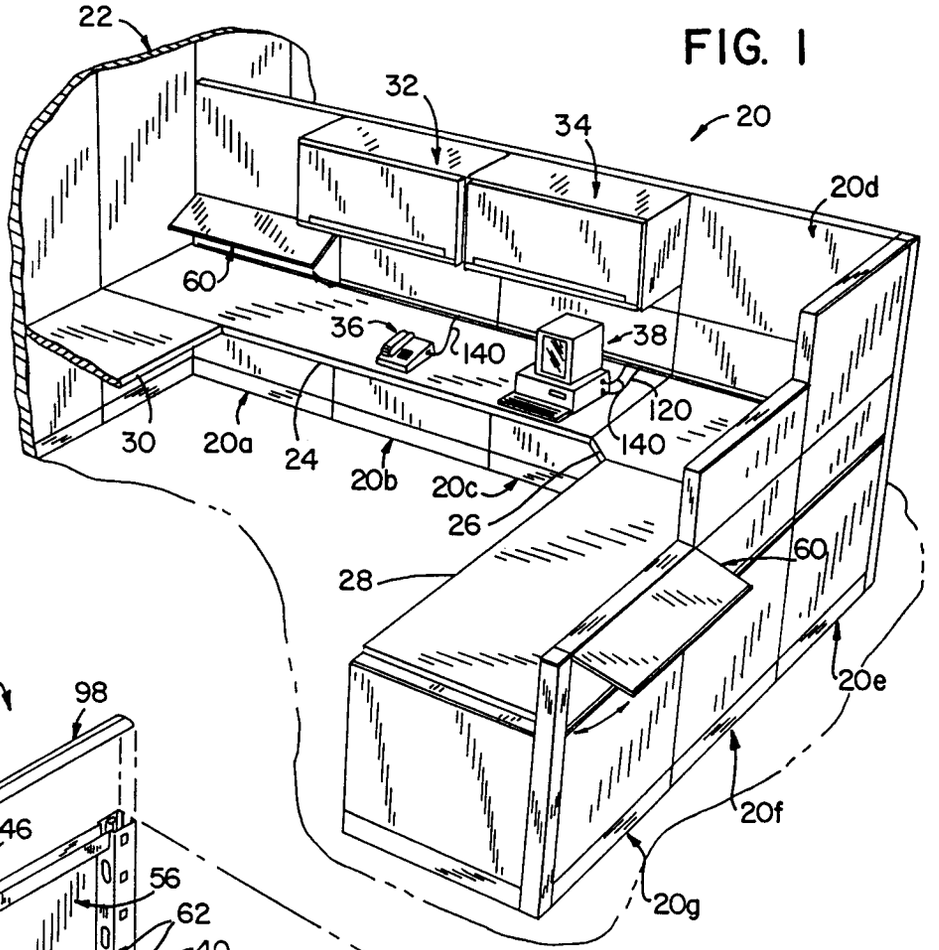
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FIG. 1

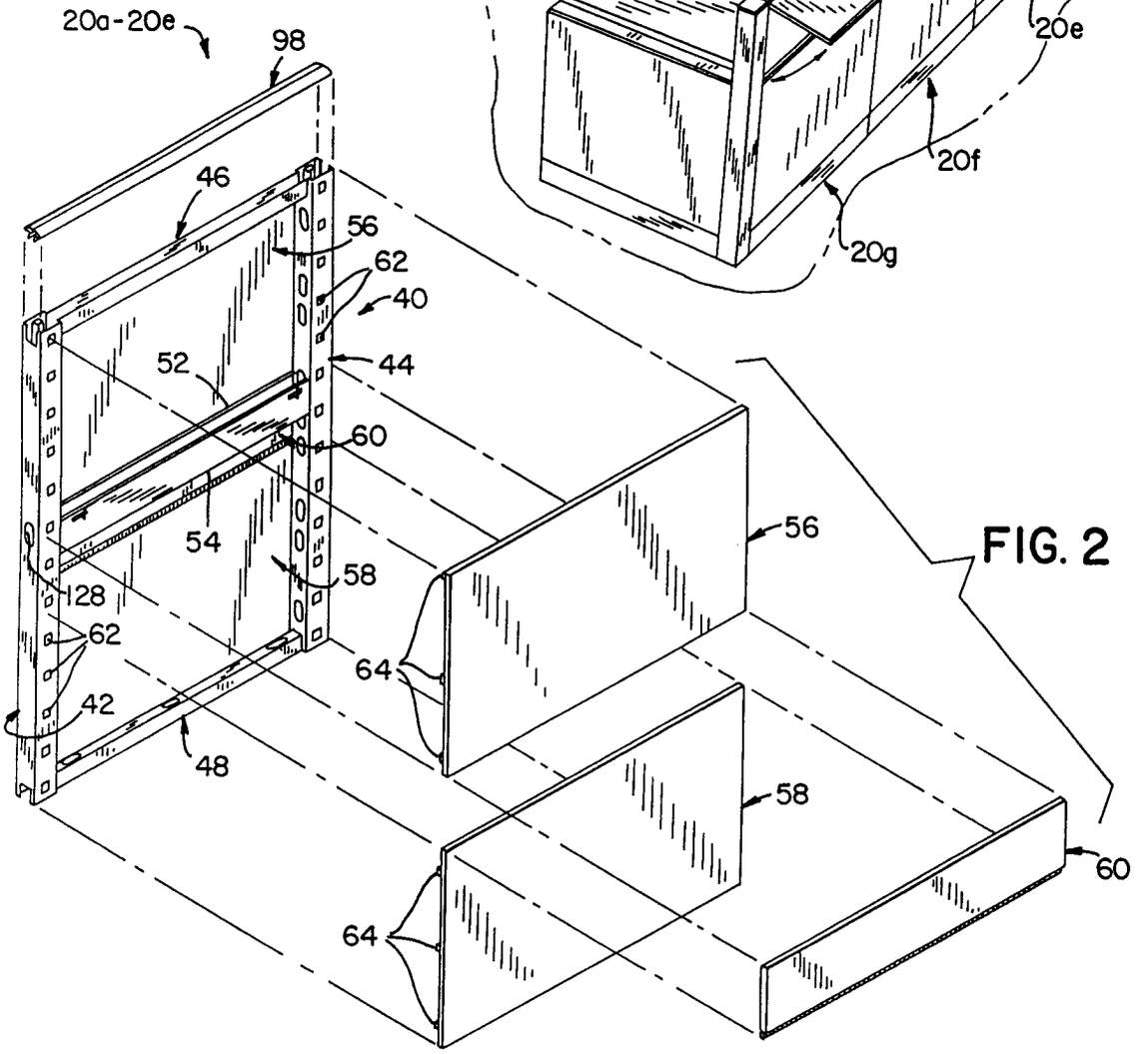
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FIG. 2

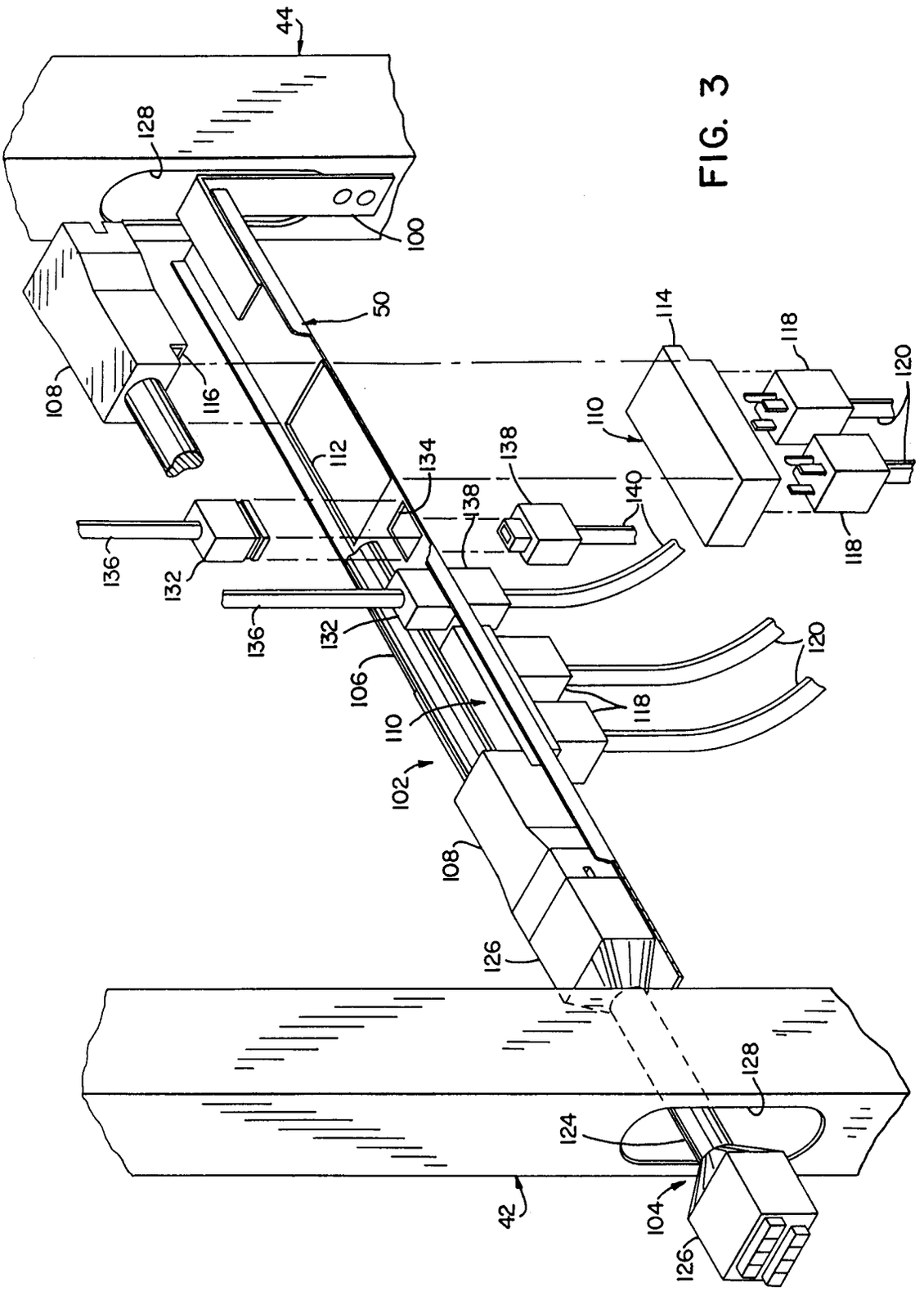
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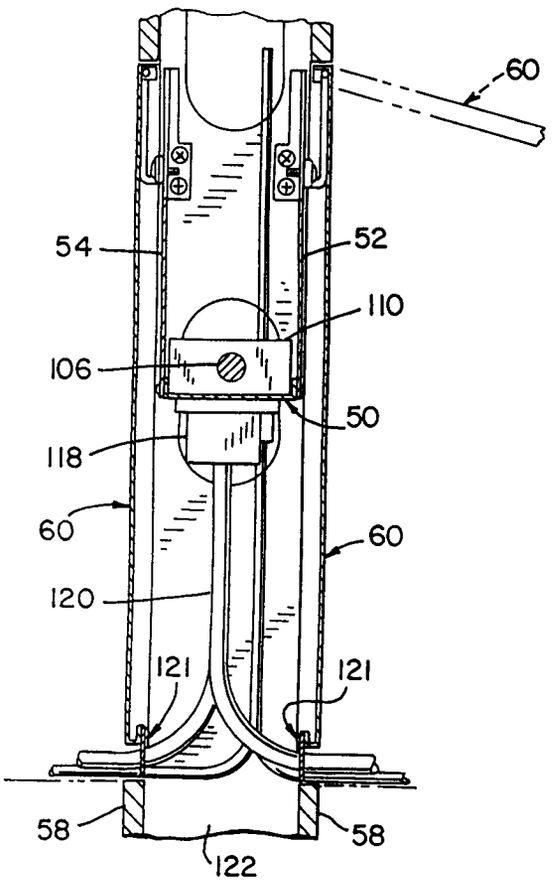
FIG. 3

FIG. 4



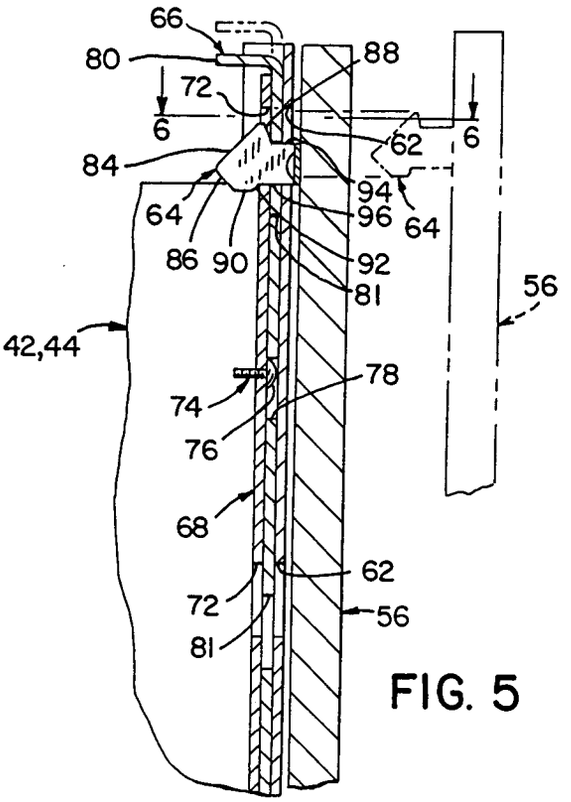


FIG. 5

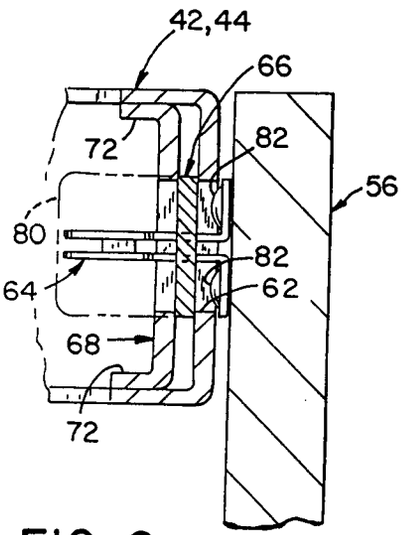


FIG. 6

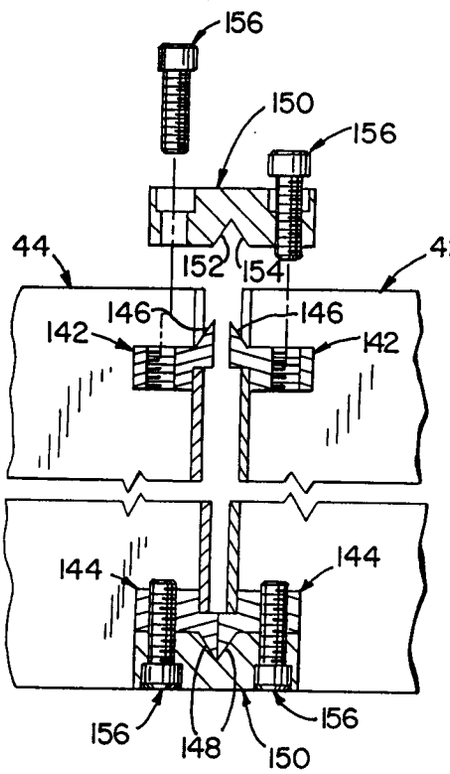


FIG. 7

FIG. 8

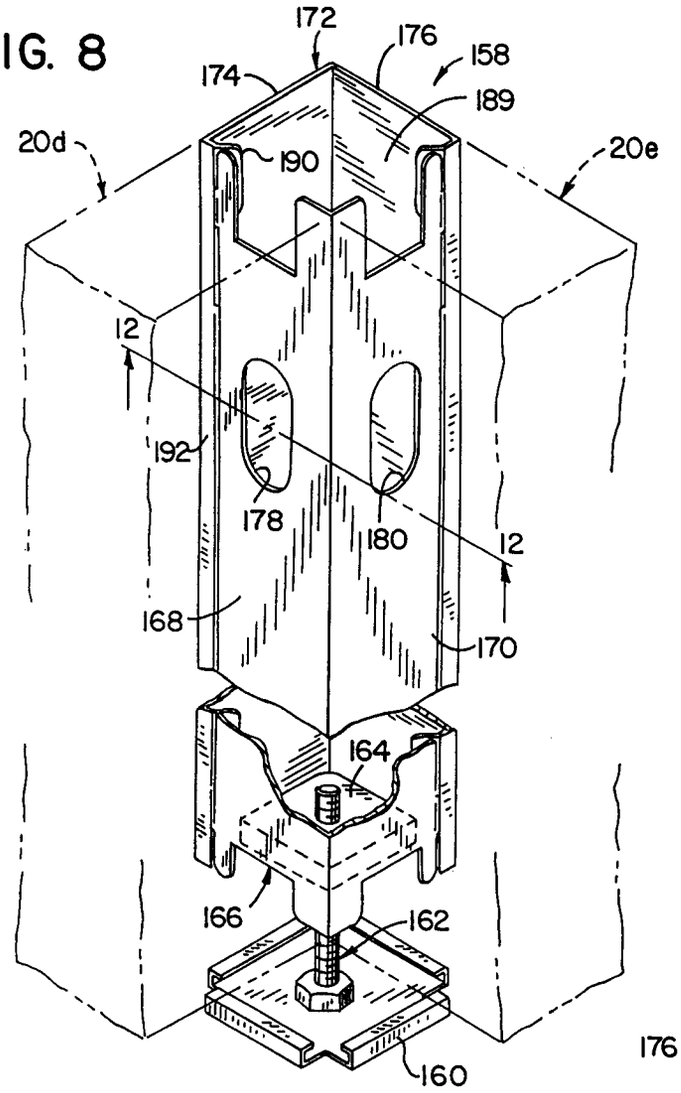
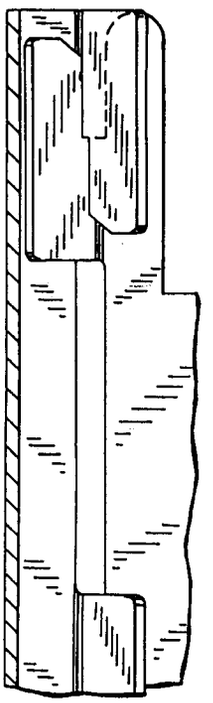


FIG. 10



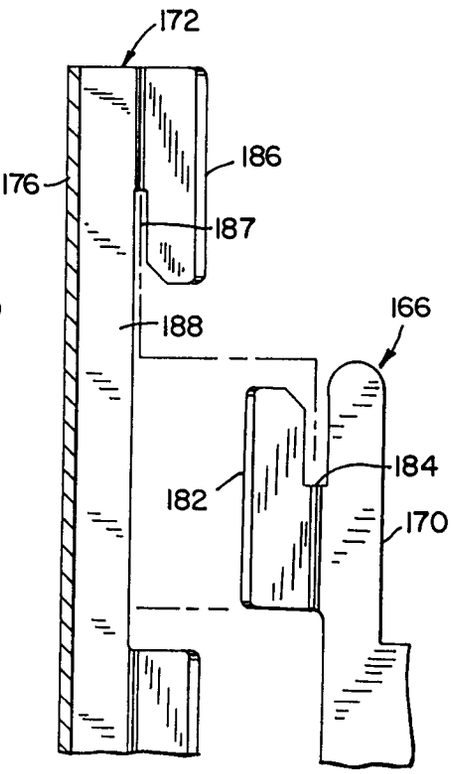


FIG. 11

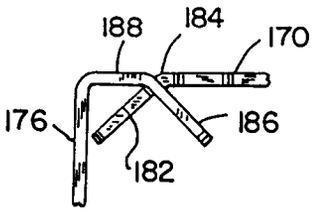


FIG. 9

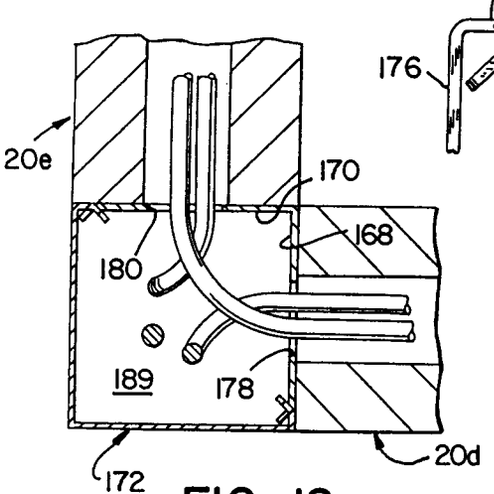


FIG. 12

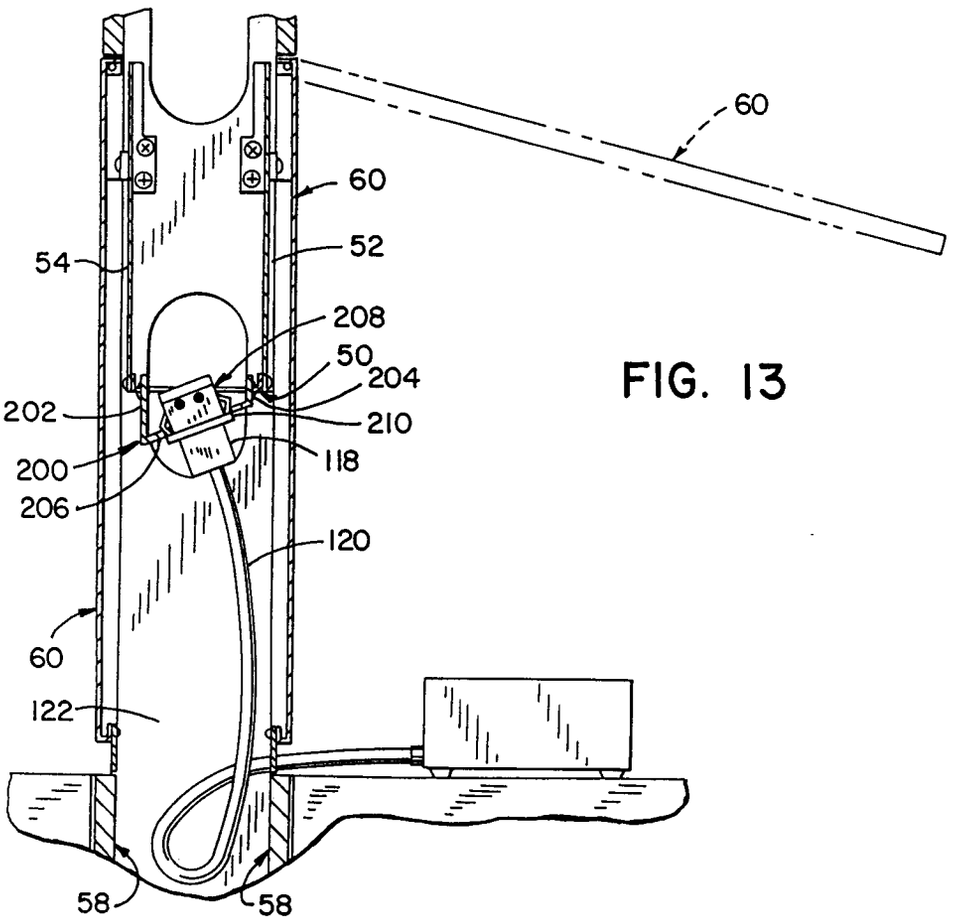

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FIG. 13

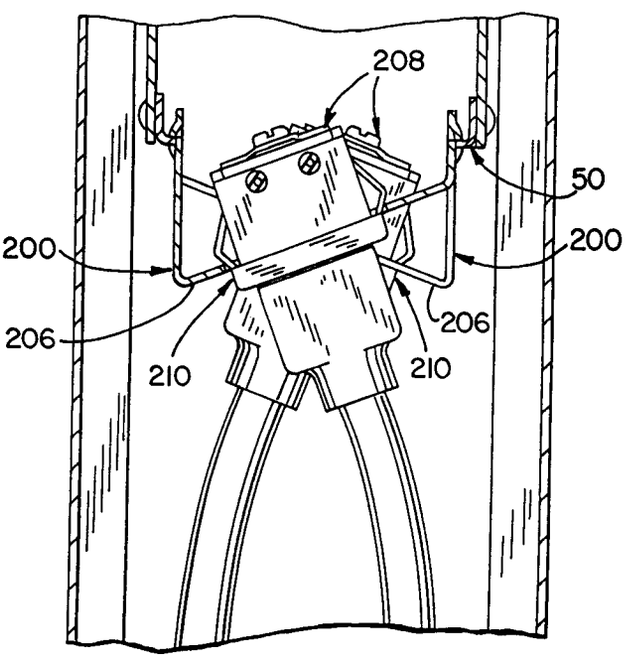
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FIG. 14

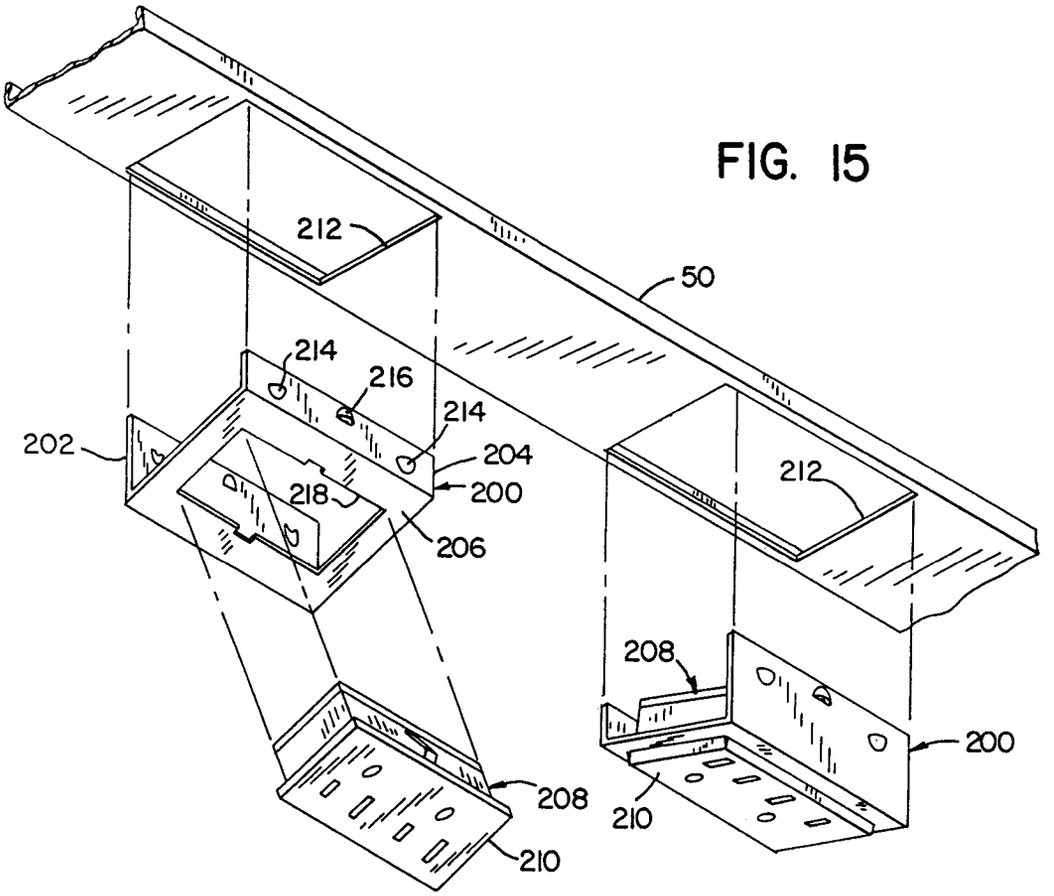

FIG. 15

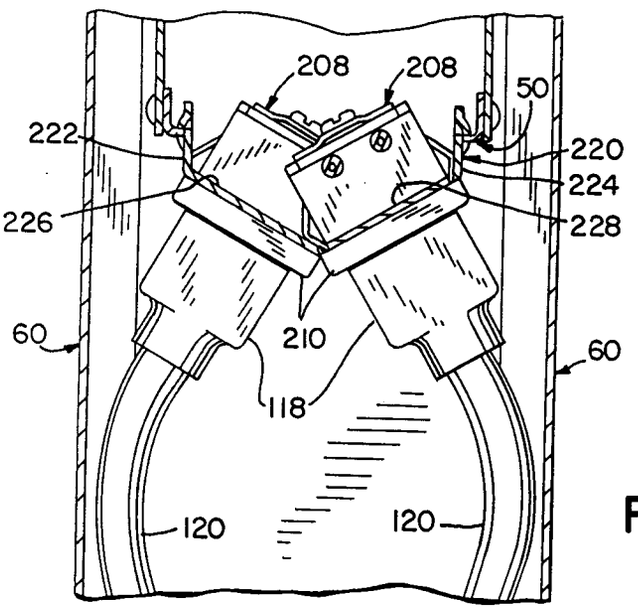

FIG. 16

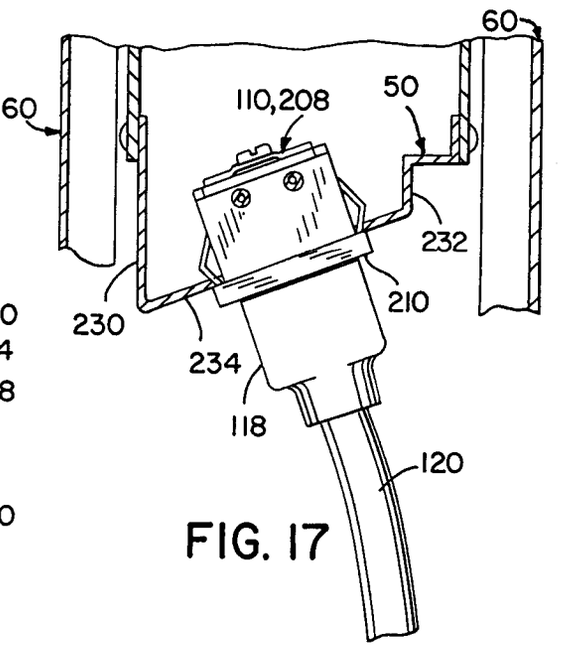

FIG. 17