

[54] ADJUSTABLE MOUNTING DEVICE

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248/285, 286

[56] References Cited

UNITED STATES PATENTS

2,106,084	1/1938	Coddington.....	52/702
3,465,996	9/1969	Wedel.....	52/235
1,109,115	9/1914	Denny.....	52/707
2,853,870	9/1958	Sinner et al.	52/704
1,305,692	6/1919	Curry.....	52/698

FOREIGN PATENTS OR APPLICATIONS

974,791	11/1963	Great Britain.....	52/235
1,472,528	1/1967	France	52/235

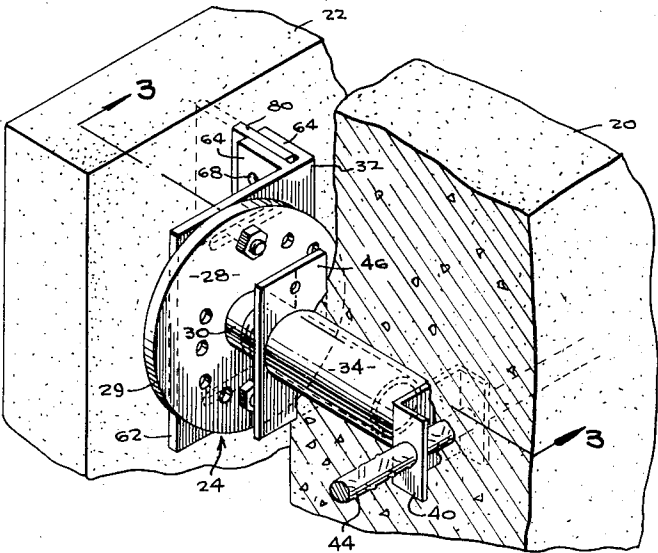
1,178,480 1/1970 Great Britain.....52/235

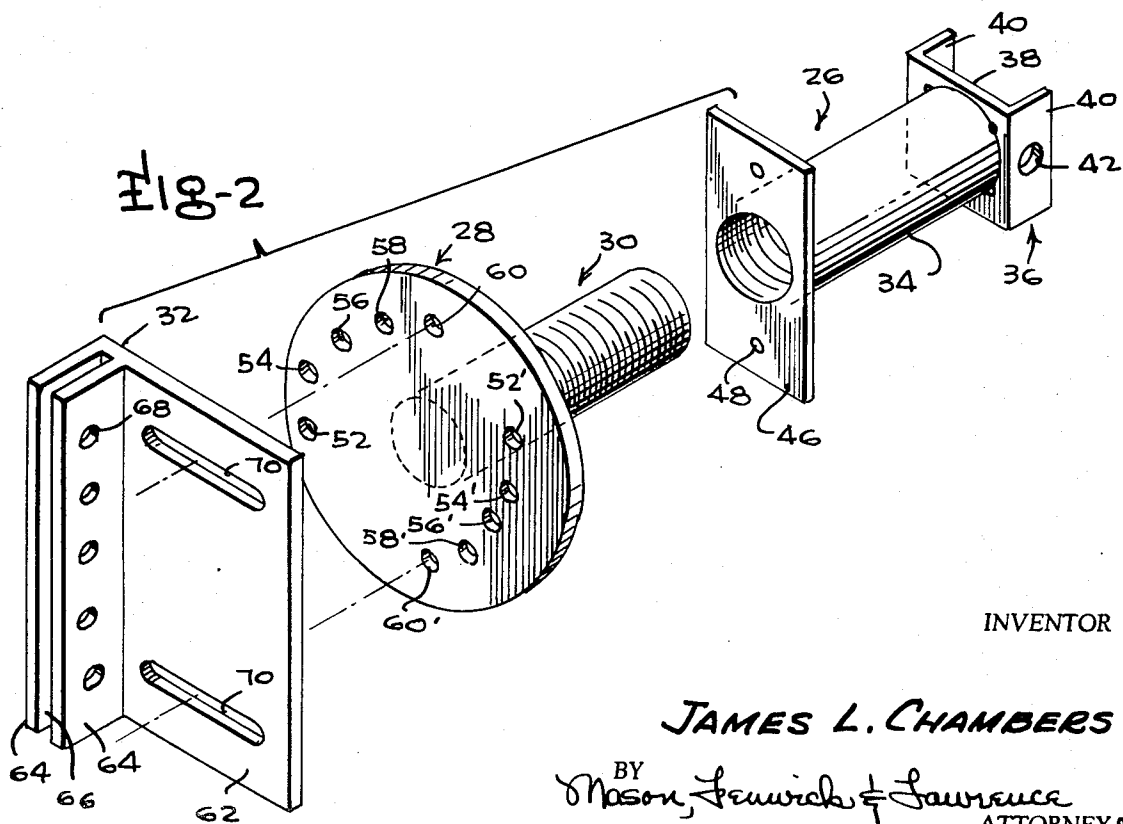
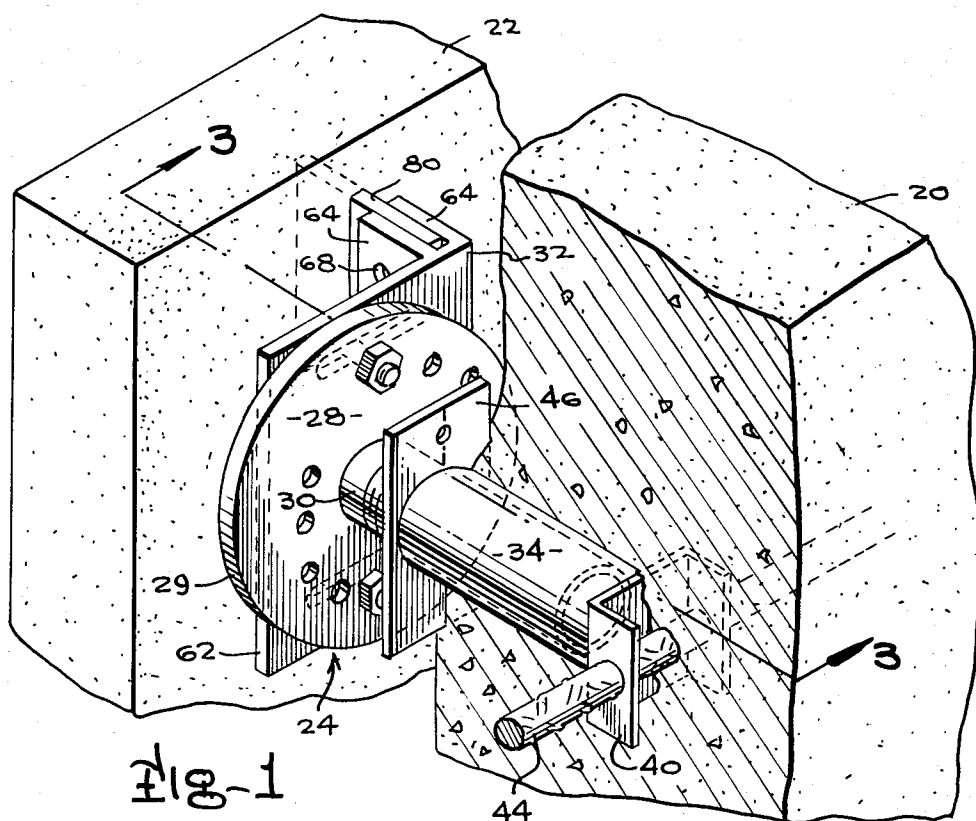
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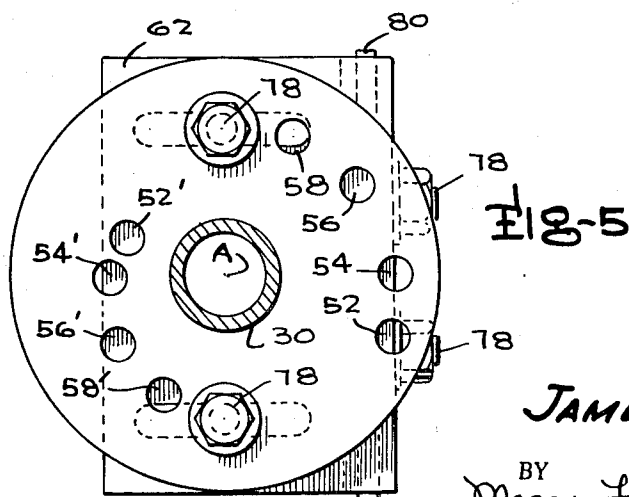
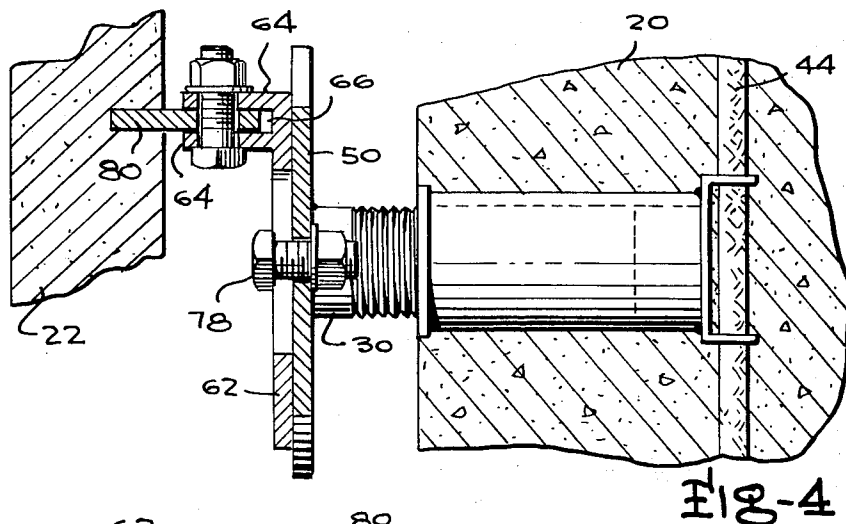
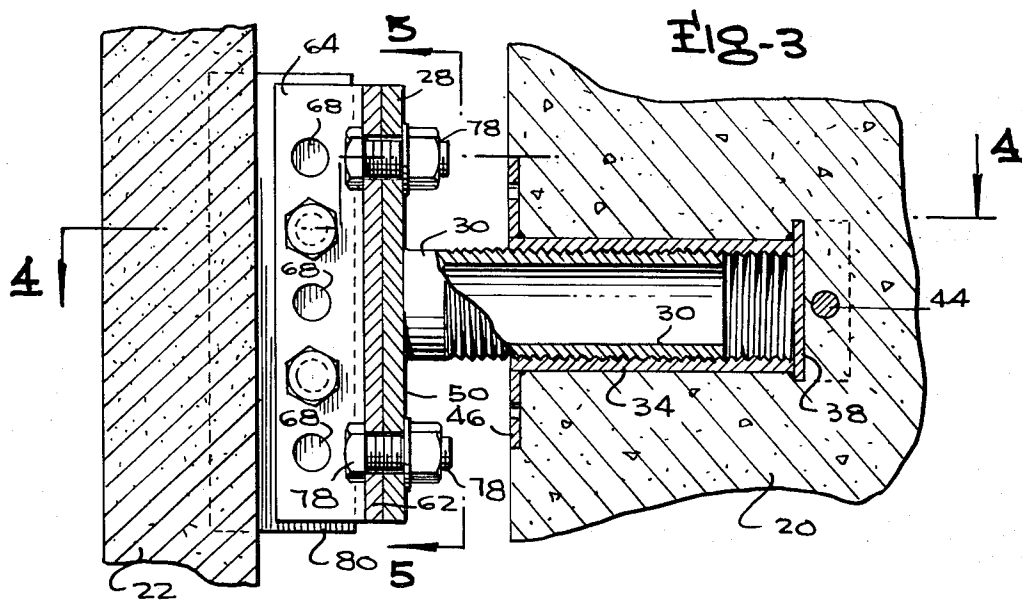
[57] ABSTRACT

An adjustable mounting device is provided for supporting a decorative slab or the like from a building frame by means of an internal sleeve connected to the building frame with a table plate having a cantilever stem threadably received on the interior of the sleeve for inward and outward movement of the slab with respect to the frame. The table plate includes a plurality of aperture pairs to which an angle bracket is adjustably connected with the angle bracket being of L-shaped configuration and having a base plate and two parallel plates forming a slot in which a fixture plate on the slab is received; the pair of spaced plates defining the slot have a plurality of apertures through which a supporting bolt means extends into the fixture plate so that horizontal and vertical adjustment in any direction is provided for enabling connection of the fixture plate to the supporting building framework.

17 Claims, 8 Drawing Figures



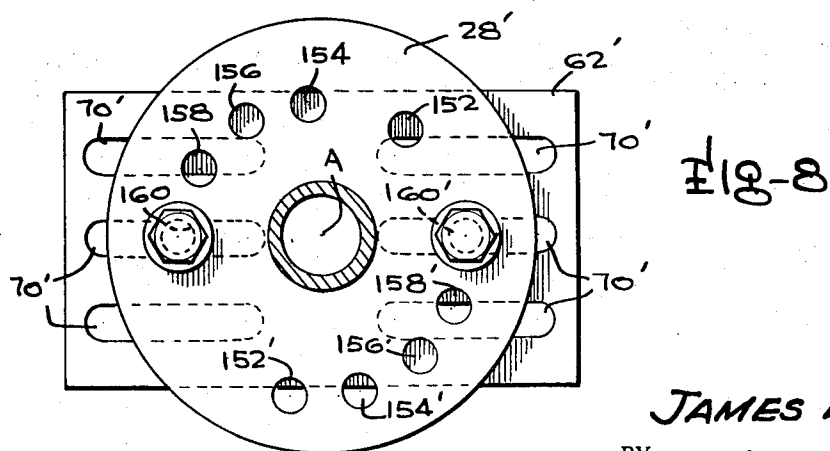
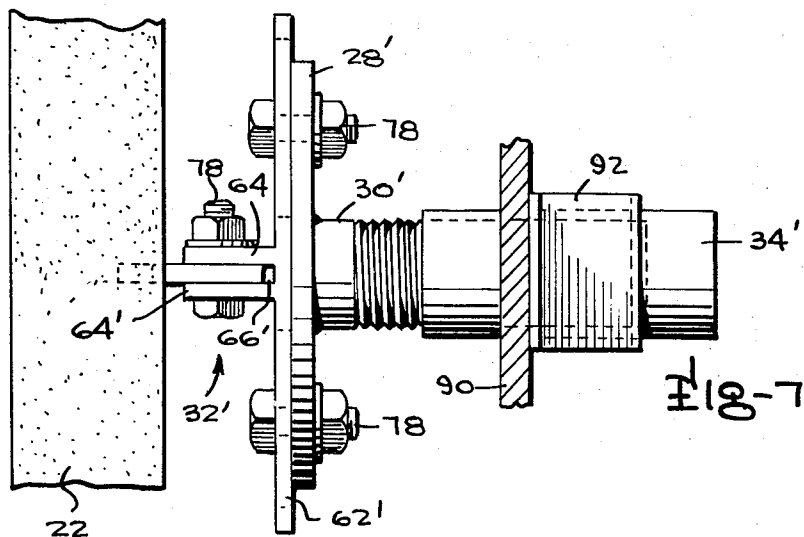
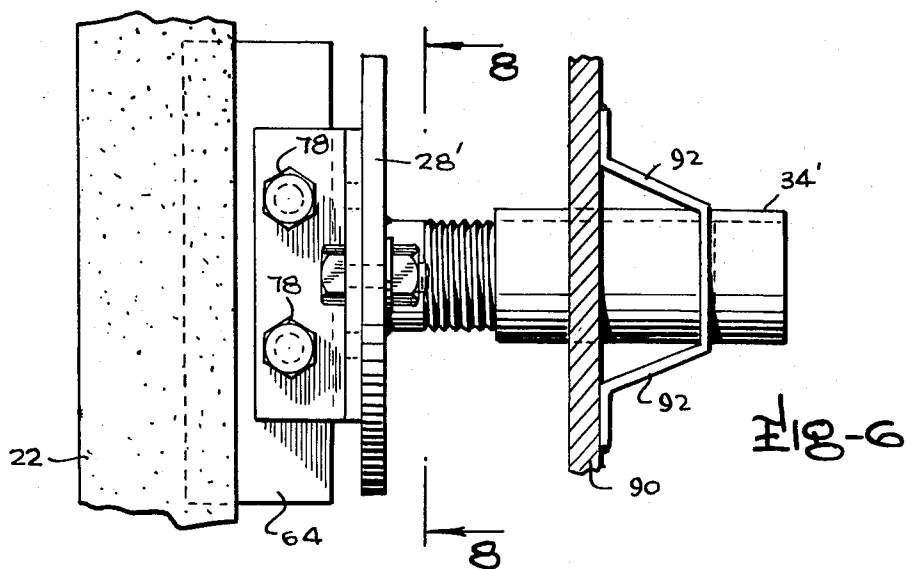




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ADJUSTABLE MOUNTING DEVICE

This subject invention is directed to constructional mounting systems and devices in general and is more particularly directed to mounting means providing support for both internal and external structural members in building or the like constructions.

Modern architectural designs frequently incorporate external cladding components in the form of sheets of masonry and the like which are supported from the main building frame which may either be reinforced concrete or structural steel as the case may be. Supporting connection for such components has previously been in the form of supporting bolts embeddedly attached to the building frame for receiving the supported elements. This type construction requires a high degree of accuracy in positioning of the bolts and the fabrication of the supported component and consequently involves considerable time and expense.

Recognition of the foregoing problems has resulted in a number of devices employing various constructions for enabling adjustment between the supported member and the supporting member in order to avoid the necessity for high structural accuracy of the order required when merely using bolt members connecting the frame and the supported elements. Unfortunately, the prior known devices have frequently suffered from design deficiencies limiting the extent of adjustment available and/or structural weakness requiring welding of the elements in order to provide a final secure connection. Devices requiring such additional welding also require that the weld be painted in order to protect against corrosion. In addition, many of the prior known devices have lacked adjustability to such a great extent as to require the use of additional shims or the like for properly establishing connection points.

Another problem encountered with many of the prior art devices is that they are limited to usage with supported members having fixtures oriented in a given fixed direction and consequently cannot be employed with other fixtures having connector portions oriented at a different angle of inclination or of a different size or shape.

Therefore, it is the primary object of this invention to provide a new and improved mounting device for enabling the attachment of a supported member to a supporting member.

Moreover, it is still a further object of this invention to provide a new and improved adjustable mounting device which is readily adjustable inwardly, outwardly, transversely and rotationally between a supporting member and a supported member.

Obtainment of the objects of this invention is enabled through the provision of a mounting means including a tubular base insert that can be attached to either a structural steel framework or a reinforced concrete framework of a modern building and which is in the form of a hollow internally threaded tubular member.

An adjustable table plate is connected to the hollow tubular member comprising the insert by means of a cantilever stem extending from one face of the table plate and threadably received on the interior of the base insert. Paired apertures are provided in the table plate for enabling the connection of an angle bracket to the table plate through a plurality of bolts extending through the paired apertures and through parallel slots in the angle bracket. Consequently, the angle bracket is

adjustable transversely with respect to the table plate and is adjustable rotatably. In addition, by connecting desired ones of aperture pairs spaced different distances transversely with respect to the table plate, further adjustment can be obtained.

The angle bracket is of L-shaped configuration and includes a pair of spaced flanges between which a slot is provided for receiving a fixture plate connecting to the supported member. Adjustment of the fixture plate with respect to the slot is enabled by means of a plurality of apertures extending through the flanges defining the slot in order to provide a still further degree of adjustability for the entire system. All adjustable connections between the various parts are made by means of solid connections and consequently completely avoid the necessity for welding and painting the connected portions as is the case with many of the prior known systems.

A better understanding of the present invention will be enabled when the following written description is considered in conjunction with the attached drawings in which:

FIG. 1 is a perspective view illustrating a first embodiment as provided in a reinforced concrete structure;

FIG. 2 is an exploded perspective view of the portion of the embodiment of FIG. 1 illustrating the major component parts thereof;

FIG. 3 is a sectional view taken along lines 3—3 of FIG. 1;

FIG. 4 is a sectional view taken along lines 4—4 of FIG. 3;

FIG. 5 is a sectional view taken along lines 5—5 of FIG. 3;

FIG. 6 is a side elevational view illustrating a second embodiment designed to be connectable to a steel frame building component;

FIG. 7 is a top plan view of the embodiment of FIG. 6; and

FIG. 8 is a sectional view taken along lines 8—8 of FIG. 6.

Attention is initially invited to FIG. 1 which illustrates a supporting member in the form of a reinforced slab 20 which provides support for a supported member in the form of a cladding slab 22 with the connection being effected by a mounting device 24 extending between the members 20 and 22.

Mounting device 24 is comprised of a plurality of major components including a base insert 26, a table plate 28, a cantilever stem 30 and an angle bracket 32. All of the foregoing components are connected together to effect a supporting connection between the elements 20 and 22 in a manner which will become apparent hereinafter.

Base insert 26 is formed of a hollow tubular sleeve 34 which is closed on its innermost end by means of a U-shaped closure and retaining member 36 formed of a base plate 38 and two parallel leg plates 40 extending perpendicularly from the edges of the base plate as clearly shown in FIG. 2. Base plate 38 is welded to the innermost end of the hollow tubular sleeve 34 for closing the end of the sleeve and an aperture 42 is provided in each of the leg plates 40 through which a reinforcing rod 44 can extend. A face plate 46 is welded to tubular sleeve 34 for connection to the external surface of the

structural component 20 by means of lugs or the like insertable through apertures 48 in the face plate if such additional attachment means should be deemed desirable. It should be noted that the U-shaped closure and retaining member 36 completely anchors the sleeve 34 in the concrete member 20 and no additional anchoring means is normally required. The inner surface of the tubular sleeve 34 is threaded as shown in FIG. 2 for receiving external threads on the tubular cantilever stem member 30.

Table plate 28 comprises a disc member 29 of circular outer configuration having a central axis A (FIG. 5) medially thereof. Cantilever stem 30 extends from an inner face 50 of the table plate coaxially with respect to the central axis A. Table plate 28 is provided with a plurality of paired apertures positioned radially from the central axis A.

Each of the aperture pairs consists of two apertures positioned on a line extending through the central axis A with the distance between the two respective apertures of each aperture pair being the same for all of the aperture pairs. The embodiment illustrated in FIG. 1 employs five aperture pairs with the first aperture pair comprising apertures 60 and 60' which are equidistantly spaced a given unit distance from the central axis A on a diameter line passing through central axis A. A base position of adjustment is defined by the positioning of apertures 60 and 60' in vertical alignment as shown in FIG. 2. This base position provides a basis from which upward or downward positions of adjustment are measured.

The second aperture pair comprises apertures 58 and 58' which are spaced apart the same unit distance as apertures 60 and 60' along a diameter line passing through axis A; however, the midpoint between the apertures 58 and 58' is spaced eccentrically from the central axis A a small increment so that aperture 58' is spaced a slightly greater distance from central axis A than is aperture 58.

Similarly, a third aperture pair comprising apertures 56 and 56' spaced apart a unit distance equal the spacing of apertures 60 and 60' is provided with the two apertures 56 and 56' having their midpoint spaced an eccentric distance away from central axis A so that the aperture 56' is spaced a slightly greater distance away from the central axis A than is the aperture 58'.

In like manner, fourth and fifth aperture pairs comprising apertures 54, 54' and 52, 52' respectively, are provided with the apertures 54 and 54' being spaced the same unit distance apart as apertures 60 and 60', while apertures 52 and 52' are also spaced the same distance apart. However, the midpoint between apertures 54 and 54' is spaced a greater distance from the central axis A than is the midpoint between apertures 56 and 56' and the midpoint between apertures 52 and 52' is spaced an even greater eccentric distance apart than is the midpoint between apertures 54 and 54'. Consequently, it should be noted that the second, third, fourth and fifth aperture pairs are progressively more eccentric by equal eccentric increments with respect to the central axis A as is evident from inspection of FIG. 2.

In addition to the above geometric relationship, additional increments of adjustment are provided by virtue of the fact that apertures 58 and 60' are spaced apart

the same unit distance as are apertures 60 and 60'. When the unit spacing is equal to 4 inches (i.e. apertures 60 and 60' are each spaced two inches from the main central axis A), the centers of apertures 58 and 60' would also obviously be spaced 4 inches apart. However, when apertures 58 and 60' are in vertical alignment, they would each be spaced one sixteenth of an inch above the respective positions of apertures 60 and 60' when in the base position. Similarly, when employing a 4 inch base spacing, employment of apertures 58 and 58' in vertical alignment (the third aperture pair) results in a vertical spacing above the base position of one eighth of an inch. Apertures 58' and 56 are also spaced apart a unit distance so that vertical alignment of these two apertures will position the apertures three sixteenths of an inch above the base position.

Apertures 56 and 56', when in vertically aligned position, are spaced one quarter of an inch above the base position and apertures 56' and 54 are similarly spaced a unit distance apart so as to be positioned in vertical alignment in which position they are five sixteenths of an inch above the base position. The fourth aperture pair comprising apertures 54 and 54' provides an adjustable position three eighths of an inch above the base position when these apertures are oriented in vertical alignment and apertures 52 and 54', which are spaced apart a unit distance, provide an adjustment position seven sixteenths of an inch above the base position. However, aperture 60' is the only aperture which is spaced a unit distance from the aperture 60, similarly, aperture 52 is the only aperture that is spaced a unit distance from aperture 52'.

It should also be noted that the above-discussed incremental positions of adjustment can be reversed downwardly from the base position by reversing the position of the apertures. For example, positioning of apertures 58 and 60' in vertical alignment with aperture 58 in the upper position provides an upper increment of adjustment above the base position of one sixteenth of an inch; however, positioning of aperture 60' in the upper position in vertical alignment with aperture 58 provides a downward position of adjustment one sixteenth of an inch below the base position. Additional downward positions of adjustment are provided for one eighth of an inch, three sixteenths of an inch etc. in an obvious manner.

Angle bracket means 32 is in the form of an L-shaped member comprising a base flange 62 and attachment flange means comprising a pair of spaced attachment flange plates 64 extending perpendicularly from adjacent one edge of base flange 62 in parallel planes and defining a slot 66 as shown in FIG. 2. A plurality of vertically extending apertures 68 are provided in both of the attachment flange plates 64 and a pair of elongated slots 70 are provided in the base flange 62 as shown in the drawings.

Angle bracket plate 32 is connected to the table plate 28 by one nut and bolt member 78 passing through one of the slots 70 and the aperture of one of the respective aperture pairs. The other bolt member passes through the other aperture of the same aperture pair. For example, if one of the bolt members passes through aperture 52, the other bolt member will pass through aperture 52'. In addition, the bolt members can be connected to extend through the other aper-

tures that are spaced a unit distance apart to provide additional increments of vertical adjustment. For example, the bolt members can be positioned in apertures 58 and 60' when these apertures are in vertical alignment. Similarly, the apertures 58' and 56 can also be employed to receive bolt members to provide an intermediate position of adjustment three sixteenths of an inch above the base position as was noted previously. Similarly, apertures 56' and 54 are also usable with the bolt members to provide a position of adjustment five sixteenths of an inch above the base position and apertures 52 and 54' can also be used for providing an adjustment position seven sixteenths of an inch above the base position.

By selecting the particular aperture pair to be employed or by using any of the two apertures spaced a unit distance apart as discussed above, the vertical height of the bracket plate is consequently adjustable by the eccentric increments of adjustment. Moreover, the table plate is adjustable inwardly and outwardly by rotating the table plate member to cause the cantilever stem 30 to move inwardly and outwardly of the hollow tubular sleeve 34.

Angle bracket means 32 supports the supported member 22 by virtue of a fixture plate 80 extending from the supported member into the slot 66. Nut and bolt assemblies 78 extend through the openings 68 in attachment flange plates 64 and through aligned openings in the fixture plate 80 with the selected openings providing a degree of vertical adjustment over the vertical adjustment obtained by selection of the particular aperture pairs in the table plate member 28. Consequently, great versatility in vertical adjustment is easily achieved. In addition, horizontal adjustment is easily enabled by virtue of the elongated slots 70 which can be adjusted transversely over a distance equal the length of the slot in an obvious manner prior to the tightening of the nut and bolt members 78.

FIGS. 6, 7 and 8 illustrate a second embodiment of the invention which is similar to the first embodiment but is usable in buildings employing a steel structure frame such as a steel component 90. A hollow tubular sleeve 34' extends through component 90 and is welded to the frame component 90. Brace plates 92 are similarly welded to the frame component 90 and the member 34' as clearly shown in FIG. 6. In all other respects, hollow tubular sleeve 34' is identical to the previously described hollow tubular sleeve 34 and receives a cantilever stem 30' extending from a table plate disc 28' similar to the members 28 and 30 of the first embodiment.

Table plate 28' differs from table plate 28 in that the apertures are provided in a different manner of orientation. Specifically, the apertures of table plate 28' are oriented in a different manner so as to provide an aperture pair comprising two apertures oriented in a horizontal plane rather than in a vertical plane for supporting a modified angle bracket 32'.

The orientation of aperture pairs on table plate 28' is such that all of the aperture pairs are spaced apart the same distance with only a first aperture pair comprising apertures 160 and 160' lying on a diameter line passing through the central axis A of the table plate 28'. A second aperture pair consisting of apertures 158 and 158' is provided in table plate 28' with the apertures

lying along a line that is offset from central axis A by a small unit eccentric increment. Similarly, a third aperture pair comprising apertures 156 and 156' are provided to lie along a line that is offset from the axis A by an amount double the unit of eccentricity of the offset of the second aperture pair 158, 158'. In like manner, a fourth aperture pair comprising apertures 154 and 154' is provided with the apertures being spaced apart the same distance as the apertures of each of the other respective aperture pairs, but with the line between the two apertures 154 and 154' being spaced an eccentric distance from the axis A as measured perpendicularly to the line from the axis by an increment of eccentricity that is three times the eccentricity of the line between apertures 158 and 158'. In like manner, a fifth aperture pair comprising apertures 152 and 152' is also provided with the distance between the apertures being equal to that of the other aperture pairs, but wherein the eccentricity of the line joining the two apertures is eight units of eccentricity.

The first aperture pair comprising apertures 160' and 160, when in horizontal alignment, define a base position in which the centerline drawn between the apertures passes through the central axis of the table plate 28' and which provides a basis for comparison with other adjustment positions defined by the various other positions of adjustment. When, for example, the apertures 160' and 160 are each spaced 2 inches from the main central axis (i.e. a unit distance four inches apart) to define the base position as illustrated in FIG. 8 of the drawings, the table plate is adjustable to a second position of adjustment in which apertures 158' and 158 comprising the second aperture pair are in horizontal alignment spaced apart the unit distance and located a unit of eccentricity one sixteenth of an inch above the base position. Similarly, the third aperture pair comprising apertures 156' and 156 when in horizontal alignment provide a position of adjustment one eighth of an inch above the base position and apertures 154' and 154 comprising a fourth aperture pair provide an adjustment position three sixteenths of an inch above the base position. Apertures 152' and 152 provide a position of adjustment one half inch above the base position.

Intermediate positions of adjustment can be obtained by horizontally aligning apertures 156 and 154' to provide an adjustment position five sixteenths of an inch above the base position. Similarly, apertures 158 and 156' provide an adjustment position three eighths of an inch above the base position (six units of eccentricity). Similarly, apertures 160 and 158' provide a position of adjustment seven sixteenths of an inch above the base position while apertures 152' and 152, when in horizontal position, provide an adjustment position one half inch above the base position. Therefore, it should be clear that the above adjustments are provided when the unit distance is 4 inches with the apertures 160 and 160' being spaced apart the unit distance as are apertures 158 and 158'. Apertures 156' and 156 are also spaced apart the unit distance as are apertures 154' and 154. In addition, apertures 152 and 152' are spaced apart the unit distance along with apertures 156 and 154' which are also spaced apart this distance. Aperture 158 is spaced from aperture 156' the unit distance. Moreover, aperture 160 is spaced from aperture 158'

by the unit distance. Additionally, aperture 152' is spaced a unit distance from aperture 152. However, aperture 160' is positionable in a horizontal line in conjunction solely with aperture 160 while aperture 152 is positionable in horizontal operative relationship solely with aperture 152'. Otherwise, the remaining apertures are each usable with either one of two distinct apertures to provide a different position of adjustment. Moreover, the apertures can be reversely positioned to provide adjustment downwardly from below the base position in an obvious manner. For example, the same increments are easily obtained by positioning the elements in this manner to be positioned downwardly below the base position defined by apertures 160 and 160'.

It should be noted that the number and position of the apertures in the table plate of either embodiment of the invention can vary in accordance with the particular installation as can the relative degree of eccentricity of the aperture pairs.

The modified angle bracket 32' is connected to the table plate member 28' by bolts 78 extending through a base plate 62' of the modified angle bracket means and through apertures 160 and 160'. Base plate 62' includes six parallel slots 70' (FIG. 8) which are parallel to provide vertical adjustment with respect to the table plate 28' in an obvious manner.

Base plate 62' is provided with first and second parallel attachment flange plates 64' extending outwardly from its forward face at a central position thereof. Plates 64' are spaced to define a slot 66' to receive a fixture plate 80 extending from a supported member 22. Plates 64' are also provided with a plurality of vertically extending apertures through which bolts 78 extend for maintaining the fixture plate 80 in position in the same manner as the fixture plate is maintained in position in the slot 66 of the previously discussed first embodiment of the invention.

Consequently, a substantial degree of adjustment in the vertical plane can be obtained by the second embodiment through rotation of the table plate 28' to various positions so as to horizontally align various ones of the aperture pairs for receipt of a retaining bolt 78 extending through the base plate 62'. In addition, further vertical adjustment is enabled by selecting one of the three pairs of horizontal slots 70' for connection to the table plate 28' in an obvious manner.

A substantial advantage of both embodiments is that they both require only a single length bolt and it is not necessary to provide multi-length bolts for employment in the system. Moreover, both embodiments completely eliminate the need for using shims, or for welding the final connection and consequently necessarily having to paint the weld to avoid subsequent corrosion. In addition, both embodiments are freely adjustable in an obvious manner with no special tools or the like being required.

Numerous modifications will undoubtedly occur to those skilled in the art; however, it should be understood that the spirit and scope of the invention extends beyond the embodiments illustrated and the invention should be limited solely in light of the appended claims. Moreover, the invention is not limited to building constructions but can easily be used for supporting any other elements of completely different character.

I claim:

1. An adjustable mounting device supportingly connecting a supported member to a supporting member, said device comprising a base insert fixedly attached to said supporting member, an adjustable table plate having an inner face, an outer face and a central axis, a cantilever stem extending outwardly from said inner face of said table plate coaxially with respect to said central axis, a plurality of table apertures extending through said table plate with said table apertures being in the form of a plurality of respective aperture pairs with each such pair comprising two apertures with the apertures in each respective pair being positioned a given fixed distance apart from each other with the midpoint between the apertures of each pair for different aperture pairs being positioned different distances radially from said central axis, said cantilever stem being adjustably received in said base insert for positioning said table plate a desired distance from said supporting member, an angle bracket comprising a base flange having an inner surface and an outer surface and including first and second internal slots extending between said inner surface and said outer surface for enabling said base flange to be connected to said table plate by connector means passing through said slots and the two apertures of one of said aperture pairs, attachment flange means extending perpendicularly from said outer surface of said base flange along said attachment flange means including a plurality of attachment flange apertures, a fixture plate extending from said supported member and including aligned apertures through which connector means can be extended into said attachment flange apertures for adjustably connecting said fixture plate to said attachment flange means so that said fixture plate position is adjustable with respect to said table plate in a direction perpendicular to said central axis of said table plate.

2. The invention of claim 1 wherein said apertures of each aperture pair are positioned along a diameter line passing through said central axis of said table plate.

3. The invention of claim 2 wherein said base insert includes a hollow tubular sleeve having internal threads, said cantilever stem comprises a cylindrical rod having external threads threadably received in the internal threads of said tubular sleeve.

4. The invention of claim 3 wherein said base insert is provided to extend inwardly into a concrete structural component and includes a U-shaped bracket affixed to its innermost end with said U-shaped bracket comprising a base plate affixed to the end of said sleeve and two arm plates extending perpendicularly from each edge of said base plate.

5. The invention of claim 4 wherein said arm plate each includes apertures in which a reinforcing rod is positionable.

6. The invention of claim 3 wherein said connector means comprises nut and bolt members.

7. The invention of claim 6 wherein said attachment flange means comprises first and second parallel flange plates extending outwardly from adjacent one edge of said base plate and spaced apart a distance equal the width of said fixture plate to define a fixture plate receiving slot in which said fixture plate is positionable.

8. The invention of claim 7 wherein said internal slots of said base flange are positioned apart a distance

approximately equal the distance between each of the apertures in each of the aperture pairs of said table plate.

9. The invention of claim 1 wherein said attachment flange means comprises first and second parallel flange plates extending outwardly from a central portion of said base flange and spaced apart a distance equal the distance of said fixture plate to define a slot for receiving said fixture plate.

10. The invention of claim 9 wherein said base insert includes a hollow tubular sleeve having internal threads, said cantilever stem comprises a cylindrical rod having external threads threadably received in the internal threads of said tubular sleeve.

11. The invention of claim 10 wherein said connector means comprises nut and bolt members.

12. The invention of claim 11 wherein said base insert is provided to extend inwardly into a concrete structural component and includes a U-shaped bracket affixed to its innermost end with said U-shaped bracket comprising a base plate affixed to the end of said sleeve and two arm plates extending perpendicularly from each edge of said base plate.

13. The invention of claim 12 wherein said arm plate

each includes apertures in which a reinforcing rod is positionable.

14. The invention of claim 1 wherein one of said aperture pairs lies along a diameter line passing through the central axis of said table plate with the other aperture pairs being positioned on lines not passing through said central axis and spaced varying distances therefrom.

15. The invention of claim 14 wherein said base insert includes a hollow tubular sleeve having internal threads and said cantilever stem comprises a cylindrical rod having external threads threadably received in the internal threads of said tubular sleeve.

16. The invention of claim 15 wherein said connector means comprises nut and bolt members.

17. The invention of claim 16 wherein said attachment flange means comprises first and second parallel flange plates extending outwardly from adjacent one edge of said base plate and spaced apart a distance equal the width of said fixture plate to define a fixture plate receiving slot in which said fixture plate is positionable.

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