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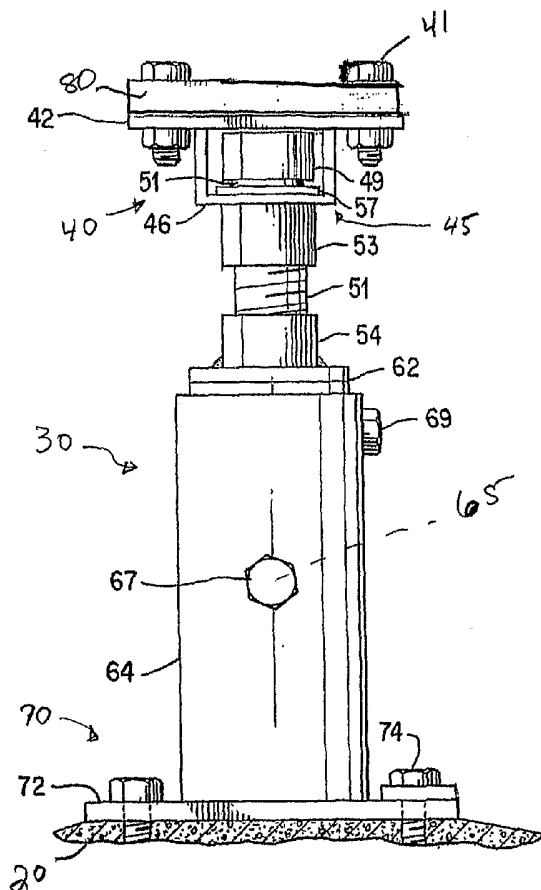
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[Continued on next page]

(54) Title: APPARATUS AND METHOD FOR SUPPORTING A MODULAR BUILDING



(57) Abstract: A method of supporting a building includes securing one end of a support stand having a telescopic structure to a movable concrete footer. The support stand may have another end with a support assembly mounted to the telescopic structure. The method includes supporting the building with support assembly of the support stand. A support stand for a supporting a building includes tubular structure with a telescopic adjustment portion for adjusting a height of a building. A support assembly mounted to the telescopic adjustment portion, the support assembly having a support plate with a plurality of apertures in a shape configured for retaining a threaded portion of a fastening member in a stationary position while a threaded nut is rotated on the threaded portion.



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APPARATUS AND METHOD FOR SUPPORTING A MODULAR BUILDING

Cross Reference to Related Applications

- [01] This application claimed the benefit of priority to U.S. Provisional Application No. 60/642,548 filed January 11, 2005, the contents are incorporated by reference.

Field of the Invention

- [02] The present invention relates to factory built residential and commercial structures, and more particularly, to an apparatus and a method of supporting buildings.

Background

- [03] Factory built residential and commercial buildings have become increasingly popular. As the cost of new construction rises, the relatively lower cost of factory built residential and commercial buildings has attracted many new buyers. Similarly, the design and use of these buildings has changed over the past years. These new designs and uses have made factory built buildings more aesthetically attractive to consumers. Factory built buildings are now widely used in place of traditionally-styled buildings including residential housing, office buildings, such as permanent and portable office buildings, classrooms and transportable hospitals.
- [04] Factory built buildings are traditionally built upon a frame containing two or more longitudinal members and/or several transverse beams that support the floors of the building. Support systems for these factory built buildings typically include concrete blocks or a plurality of support stands placed under the frame for supporting it and securing it to a type of foundation. Skirting, extending from the factory built building's rim joist to a point within the ground, is commonly used to secure and hide the foundation support system and provide a more aesthetic appearance. However, conventional foundation support and skirting systems may not provide adequate support to the factory built building in response to the lateral forces created by heavy winds, seismic activities or heavy snow. Unfortunately, those systems that may provide adequate support can be costly to produce and

install. Additionally, these systems may be aesthetically unattractive. Further, when a cement foundation/footing is poured for aesthetic purposes, the poured concrete must be allowed to set at the job site, thereby delaying the assembly of the building at the job site.

- [05] There is a need in the art for an apparatus useable with factory built buildings to provide ease of assembly and support.

Summary of the Invention

- [06] The present invention relates to a method of supporting a building, such as a modular home or site built homes.
- [07] In one aspect there is provided a method of supporting a building by securing one end of a support stand having a telescopic structure to a movable concrete footer. The support stand may have another end with a support assembly mounted to the telescopic structure. The method includes supporting the building with support assembly of the support stand.
- [08] In one aspect, there is provided a method of supporting a building by a framing member and a support assembly having an upper plate and lower plate, the upper plate and the lower plate having a first set of apertures and the framing member having a second set of apertures, the method includes a step of positioning the frame member between the upper plate and the lower plate and securing a plurality of fastener members to the framing member and the support assembly via the first set of apertures and the second set of apertures.
- [09] In another aspect of a method of supporting a building, a plurality of fastening members have a threaded cylindrical portion which mates with a threaded nut, a method includes a step of securing the fastening members with the upper plate keeping the threaded cylindrical portion stationary while advancing the threaded nut thereon.
- [10] In one aspect, there is provided a method of supporting a building by a framing member and a supporting assembly has a support plate, support plate having a

first set of apertures and the framing member having a second set of apertures, the method including a step of positioning the frame member on the support plate and securing the framing member with a plurality of fastener members via the first set of apertures and the second set of apertures.

- [11] In another aspect of a method of supporting a building, a plurality of fastening members have a threaded cylindrical portion which mates with a threaded nut, the method including a step of securing the fastening members by the framing member keeping the threaded cylindrical portion stationary while advancing the threaded nut thereon.
- [12] In another aspect, there is provided a support stand for a supporting a building. The stand includes tubular structure including a telescopic adjustment portion for adjusting a height of a building. A support assembly mounted to the telescopic adjustment portion, the support assembly having a support plate with a plurality of apertures in a shape configured for retaining a threaded portion of a fastening member in a stationary position while a threaded nut is rotated on the threaded portion.
- [13] The above and other aspects, features and advantages of the present invention will be readily apparent and fully understood from the following detailed description illustrative embodiments in conjunction with the accompanying drawings, which are included by way of example, and not by way of limitation with regard to the claimed invention.

Brief Description of the Drawings

- [14] Figure 1 is a perspective exploded assembly view of one embodiment of a support system;
- [15] Figure 2 is a perspective exploded assembly view of an alternative embodiment of a support system; and
- [16] Figures 3 and 4A-4E illustrate alternative embodiments of a support system.

Detailed Description

- [17] The following embodiments and aspects thereof are described and illustrated in conjunction with systems and methods which are meant to be illustrative and non-limiting in scope. In a brief overview, an aspect of the present invention relates to a method of supporting a modular building, such as a modular home. Modular buildings according to the present invention include modular “factory built” buildings and “site built” (stick built) buildings. Modular factory built buildings used with this method include those buildings built in a factory in modules. The modules are then transported to the erection site on temporary “carrier” chassis that are removed before the building is completed. After arriving at the erection site, the modules are connected together to form a complete building. Site built buildings include those buildings that are constructed using raw materials on the site in which they are intended to remain permanently.
- [18] Both modular factory built buildings and site built buildings include outer, lower framing members that form the outer framing support structure of the building and part of the flooring system. These framing members are substantially planar and located along the outer sides of the buildings. These lower framing members are also positioned proximate the lowest points of the building. As a result, vertical and horizontal support stands can be located under the building and secured to the appropriate framing members in order to hold the building in place. These framing members are typically planar members aligned with the lower surface of the building or vertically spaced from the lower surface of the building. Examples of these planar members include wooden boards, such as 2x8's or 2x10's. Other known framing boards can also be used. Alternatively, the framing members can be formed of metal or other materials that can include holes, including threaded holes.
- [19] Figure 1 illustrates a support system 10 for a modular building that can be used in a method of the present invention. The modular building is generally constructed and assembled with framing members 80 (Figure 2) that form the outer lower

framework of the modular building and a support structure for the flooring system of the modular building, as discussed above. The support system 10 includes support stands 30 that are spaced about the perimeter of the building. Preferably, the support stands 30 are spaced approximately 10 and 12 feet apart, depending on the under structure of the building. However, the number and placement of the stands 30 are typically dictated by local building codes.

- [20] As illustrated in Figures 1-4A, an embodiment of the support stand 30 includes a clamping assembly 40, a head unit 45 and base 70. The base 70 includes base plate 72 and a plurality of fasteners 74 which secure the plate 72 to light-weight concrete footers 20. The fasteners 74 can include nuts and bolts, masonry screws or other similar fasteners. The footers 20 support the support stands 30 above leveled ground or a poured slab, such as a poured concrete pad.
- [21] In one embodiment, the plate 72 is 8" x 8" and ¼ inch thick. For this embodiment, the footer 20 can be 24" wide x 48" long and is 4" thick in the center. This footer 20 is produced using a concrete mold in a factory under controlled conditions so that the size and shape are controlled. The footer 20 has an 8" x 8" flat square top surface that includes two plastic inserts poured into the footer 20. These plastic inserts receive the fasteners 74.
- [22] In an embodiment, the clamping assembly 40 positively locks the support stand 30 to the framing members 80 of the modular building. In an embodiment illustrated in Figure 1, the clamping assembly 40 includes a support plate 42 for receiving and supporting the lower surface of at least one framing member 80 and a second plate 43 that can be positioned on an upper surface 82 of the supported framing member 80. This clamping assembly is similar to that disclosed in U.S. Patent No. 5,862,635 to Linse that is herein incorporated by reference. Fasteners 41 extend through the framing member 80 and the first and second plates 42, 43 to secure the framing member 80 to the support stand 30. In a preferred embodiment, the fasteners 41 include nuts and bolts; however, any conventional

fastener for securing two plates together may be used. If desired, circular rods 44 may be added to the plate 42. (FIG. 1)

- [23] In an embodiment illustrated in Figure 2, the second plate 43 is not utilized. Instead, the fastener 41 is directly in contact with the top side of the framing member 80. In this embodiment, the bolt or nut head would engage the framing member 80 in place of the second plate 43.
- [24] In a third embodiment illustrated in Figures 3 and 4A-4E, the clamping assembly 40 includes the support plate 42 for at least one framing member 80 and a plurality of fasteners 41, such as lag bolts, that can extend through the support plate 42 and be secured directly into the framing member(s) 80. In the illustrated embodiment, the first plate 42 is 8" x 10" x 1/4" thick. The top plate has a series of holes or apertures 59 (see Figures 4A-4E) formed in a predetermined pattern that, with the fasteners 41, provides a secure connection between the first plate 42 and the framing member 80. Different hole 59 patterns can be provided for plates 42 used at different locations along the framing member 80. Each hole 59 in the plate 42 receives an elongated threaded fastener 41, such as a screw. An example of such a screw is a lag screw, also known in the industry as a lag bolt. These screws (lag bolts) can be 2-1/2" long x 1/2" in diameter.
- [25] As shown in Figures 1-4A, and 4C, the head unit 45 is positioned below the clamp assembly 40 and attached thereto. The unit 45 includes a U-shaped channel member 46 secured to the underside of the first plate 42. In a preferred embodiment, the channel member 46 is welded to the first plate 42, however, other well known securing techniques may be used. The channel member 46 defines a space 47 between its inner bottom floor 48 and the underside of the first plate 42 which contains a support member 49, an end 52 of a threaded rod 51 and a bushing 57. The support member 49 is secured to the end 52 of the rod 51 and rotates with the rod on bushing 57 for ease of turning. Preferably, support member 49 is a threaded nut that is welded to the end of the threaded rod 51. As shown in Figure 2, tolerance exists between support member 49 and the underside

of first plate 42 before the framing member 80 is fully loaded on the first plate 42 so that clamping assembly 40 can tilt slightly relative to support member 49, thereby facilitating the contact between the first plate 42 and the framing member 80. When the framing member 80 is properly positioned on first plate 42, support member 49 contacts first plate 42 and distributes the load of the building over the entire head unit 45 so the forces experienced by any one portion of the support stand 30 are lower when compared to conventional support stands. This distribution of the load extends the life of the support stand 30 and reduces its chance of failure.

- [26] A fine height adjusting mechanism 50 and a stepwise height adjusting mechanism 60 are provided between the clamping assembly 40 and the base 70 for leveling the building. These mechanisms 50, 60 vary the distance between the building and the foundation to compensate for uneven terrain or the movement of the foundation over time. The stepwise height adjustment mechanism 60 varies the height of the building in predetermined increments. Increments of approximately two to five inches are preferred, with the most preferred increment being approximately three inches. The fine height adjustment mechanism 50 varies the height of the building within the increments of the stepwise adjustment mechanism 60.
- [27] Fine height adjusting mechanism 50 includes the threaded rod 51, a tool engaging member 53 secured to rod 51 and a rod receiving member 54 operatively attached to base 70. The tool engaging member 53 supports the underside of the U-shaped channel member 46 and initially receives the load of the building frame when it is placed on the first plate 42, to prevent failure of the rod 51 and allow for the clearance discussed above between the underside of the first plate 42 and the support member 49. In a preferred embodiment, the tool engaging member 53 is a nut secured to the threaded rod 51 by welding or other known techniques. Gradual and fine adjustment of the building height relative to the foundation is accomplished by rotating rod 51 within a receiving member 54 using tool engaging member 53. The tool engaging member 53 receives a wrench or other

such tool for rotating the rod 51. Receiving member 54 is preferably a threaded nut which fixed to an upper end 61 an inner tube 62 of the stepwise adjustment mechanism 60. The receiving member 54 could also be positioned within the inner tubular member 62.

- [28] The stepwise height adjusting mechanism 60 includes the inner telescopic tubular member 62 carrying the receiving member 54 and an outer tubular member 64 which telescopically receives inner tubular member 62. A plurality of apertures 63 are vertically spaced along opposite sides of the inner tubular member 62 at intervals which achieve the predetermined, incremental height adjustment discussed above. As shown, apertures 65 are also located on opposite sides of the outer tubular member 64. A bayonet pin or bolt 67 is placed through the apertures 65 when they are properly aligned for a given height with a pair of the apertures 63 in the first tubular member 62. The outer tubular member 64 also includes an anti-rattle aperture 68. A bolt 69 is inserted through aperture 68 and frictionally engages the inner tubular member 62 to prevent it from rattling within the outer tubular member 64. It is also contemplated that the telescopic relationship between the tubular members 62, 64 could be reversed.
- [29] The method according to the present invention includes a step of supporting a modular building at a predetermined erection site. The building can be a factory built or site built building as discussed above. The method includes the steps of securing the support stand 30 to the light-weight concrete footer 20 as shown in the figures. The footer 20 and support stand 30 are then positioned at appropriate locations on a properly graded site for supporting the building. When secured on top of the support stand 30, the building is supported against applied vertical and lateral loads. The position of these footers 20 and support stands 30 is determined by the building manufacturer's instructions or engineer instructions.
- [30] After the position of the footer 20 and support stand 30 have been approximately set, the course height adjustment of the support stand 30 is set for a given height. When each support stand 30 has been set to an appropriate height, the building is

either lowered onto the support stands 30 (for a factory built building) or the assembly of the building begins on the support stands 30 (for a site built building). Regardless of which type of building is supported, the clamp assembly embodiments 40 discussed above can be used to secure the building to the support stand 30.

- [31] For a factory built building, the ground level portions are either craned or in some other way lowered onto the support stands 30. Typically if the modules are crane set, one corner of the module is set on a support stand 30 and the module is lowered slowly in order to manipulate the module into the correct position in which it will remain permanently. The module is then lowered into its final resting position. Additional modules are set in the same fashion and attached permanently to the modules that are already set. The support stands 30 can be moved in any direction as needed before the building modules are completely at rest in order to obtain the proper positioning. Second-story modules of the building can then be added if applicable on top of the ground level modules. Once the building is in its permanent resting position, the head assemblies are fully secured to the framing member 80.
- [32] The clamping assembly 40 illustrated in Figures 1-4A secures the framing member 80 of either the factory built building or the site built building to the support stand 30. In this part of the method, the plate 42 is positioned under the framing member 80 of either the factory built or site built building so that it supports the framing member(s) 80. The fasteners 41, such as lag bolts, are advanced through the openings 59 in the plate 42 and into the framing member 80 (See Figure 3). This is performed for each of the support stands 30.
- [33] In an alternative embodiment of the method, the fasteners 41 extended through the plate 42 are bolts that cooperate with nuts to secure the framing member 80 to the support stand 30. In this embodiment (Figure 2), the support stand 30 and framing member 80 are positioned so that the framing member 80 is supported by the plate 42. Then, the bolts are advanced through the openings 59 in the plate

42. Threaded fastening nuts are secured to the ends of the bolts on the opposite side of the framing member 80 from the plate 42. In an embodiment, the framing member can include a recess that matches the shape of the nut and bolt head so that a wrench is not needed to hold the nut or bolt head as the nut and bolt are being tightened.

- [34] In another embodiment, the clamping assembly 40 illustrated in Figure 1 is used to secure the framing member 80 to the support stand 30. In this embodiment, the plate(s) 43 is positioned on the opposite side of the framing member from the plate 42. As a result, after the support stand and framing member are in the proper vertical and horizontal position, the plate 43 is positioned on the top surface of the framing member 80 and bolts are advanced through the plates 42, 43 and the framing member 80. In this embodiment, it may be necessary to have access to the upper surface of the framing member 80 at the time that the nut and bolt are tightened. Alternatively, the plate 43 can include a recess that matches the shape of the nut and bolt head so that a wrench is not needed to hold the nut or bolt head as the nut and bolt are being tightened.
- [35] After the clamping assemblies 40 have secured the framing member(s) 80 to their respective support stands 20, the final height of the building can be adjusted, where needed, by manipulating the height adjustment mechanisms 50, 60. Also, for the site built buildings, the remainder of the building can be constructed on top of the framing members 80. For example, if just the floor of the building was constructed above the framing members 80 prior to securing the framing members 80 to the support stands 30, the remainder of the building would be framed and completed.
- [36] After the height of the building is set and the building is level, skirting panels can be positioned against the supports and/or the building to hide the support stands 30 and increase the aesthetic appearance of the building. Skirting panels that can be used in the method are disclosed in U.S. Patent Application Nos. 10/821,837; 10/821,873 and 10/821,874. All of these applications were filed on April 12,

2004 and are hereby incorporated in this application by reference. After the skirting panels are in place, the area around the panels can be backfilled for support.

- [37] In another embodiment, the support plates 42 positioned at the corners of the buildings could include vertical sidewalls on both their outer and inner edges. In such an embodiment, the framing member 80 could be secured to the support stand 30 using both vertically and horizontally positioned fasteners.
- [38] Different sized building frames can be accommodated by the present invention merely by changing the size of the clamping assembly 40.
- [39] Numerous characteristics, advantages and embodiments of the invention have been described in detail in the foregoing description with reference to the accompanying drawings. However, the disclosure is illustrative only and the invention is not limited to the illustrated embodiments. It will be apparent to persons ordinarily skilled in the art that modifications may be made thereof within the scope of the invention, which scope is to be accorded the broadest interpretation of the claims such as to encompass all equivalents, devices, and methods. Therefore, various changes and modifications may be effected therein by one skilled in the art without departing from the scope or spirit of the invention.

What is claimed is:

1. A method of supporting a building, comprising:
securing a base end of a support stand having a telescopic structure to a movable concrete footer; the support stand having top end with a clamping assembly mounted to the telescopic structure; and
supporting the building with the clamping assembly of the support stand.
2. The method according to claim 1, positioning a lower of portion of the building on the clamping assembly.
3. The method according to claim 2, wherein the lower portion of the building includes a framing member and the clamping assembly comprises an upper plate and lower plate, the upper plate and the lower plate having a first set of apertures therethrough and the framing member having a second set of apertures, the method further including a step of positioning the frame member between the upper plate and the lower plate and securing a plurality of fastener members to the framing member and the clamping assembly via the first set of apertures and the second set of apertures so that the fastening members are disposed in the upper plate, lower plate and framing member.
4. The method according to claim 3, wherein fastening members have a threaded cylindrical portion which mates with a threaded nut, wherein the step of securing the fastening members includes, the upper plate keeping the threaded cylindrical portion stationary while advancing the threaded nut thereon.

5. The method according to claim 2, wherein the lower portion of the building includes a framing member and the clamping assembly has a support plate, support plate having a first set of apertures therethrough and the framing member having a second set of apertures, the method further including a step of positioning the frame member between on the support plate and securing the framing member with a plurality of fastener members via the first set of apertures and the second set of apertures.

6. The method according to claim 5, wherein fastening members have a threaded cylindrical portion which mates with a threaded nut, wherein the step of securing the fastening members includes, the framing member keeping the threaded cylindrical portion stationary while advancing the threaded nut thereon.

7. The method according to claim 5, further including a step of telescopically adjusting a height of the building.

8. The method according to claim 6, further including a step of telescopically adjusting a height of the building.

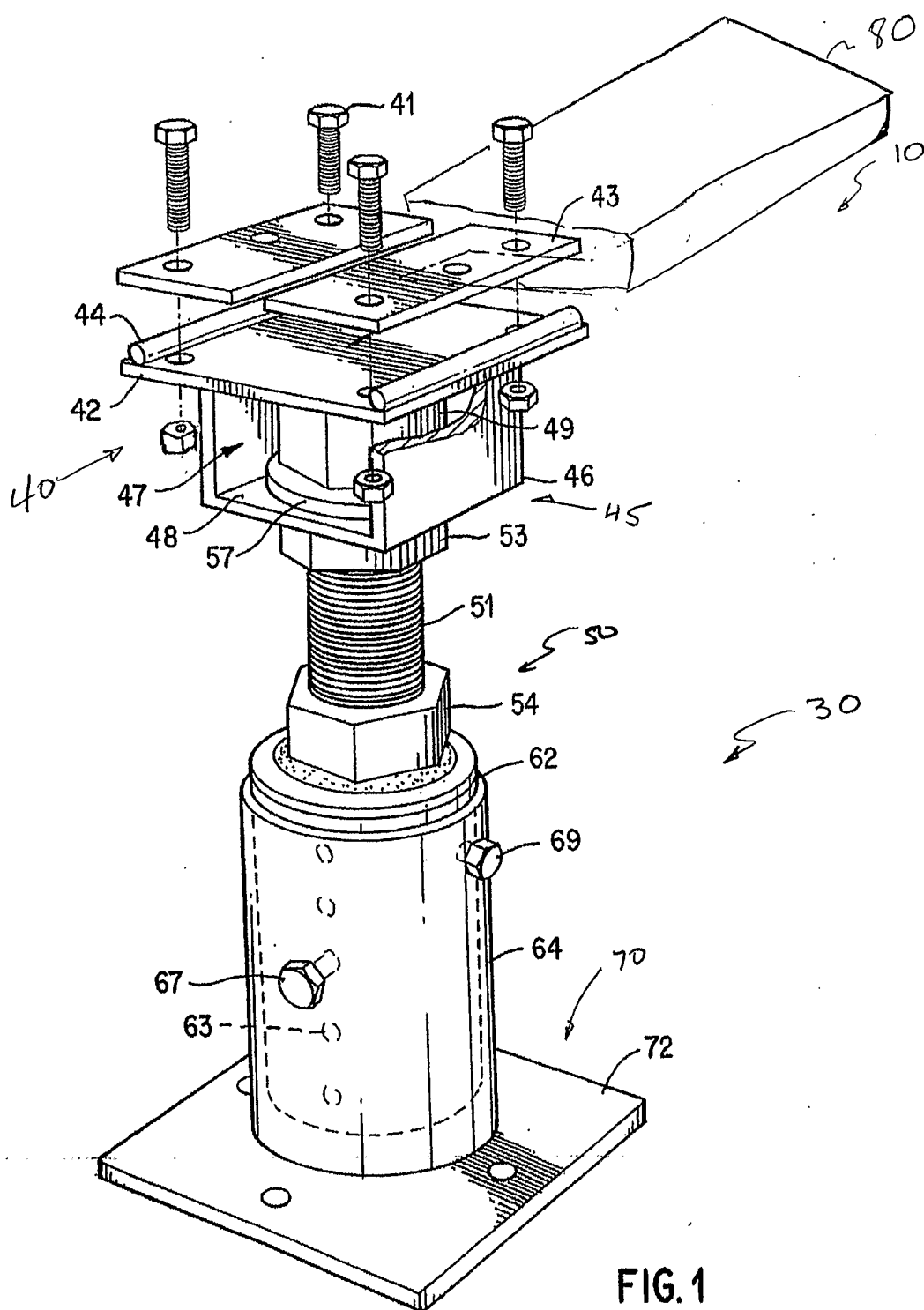
9. A support stand for a supporting a building, comprising:
a tubular structure including a telescopic adjustment portion for adjusting a height of a building;

a clamping assembly mounted to the telescopic adjustment portion, the clamping assembly having a support plate with a plurality of apertures in a shape configured for retaining a threaded portion of a fastening member in a stationary position while a threaded nut is rotated on the threaded portion.

10. The support stand according to claim 9, wherein the support plate includes a recess having said shape.

11. The support stand according to claim 10, wherein the shape is hexagonal.

12. The support stand according to claim 9, further including a base portion provided at an opposite end of the tubular structure from the support assembly, and a light-weight concrete footer mounted to the base portion.



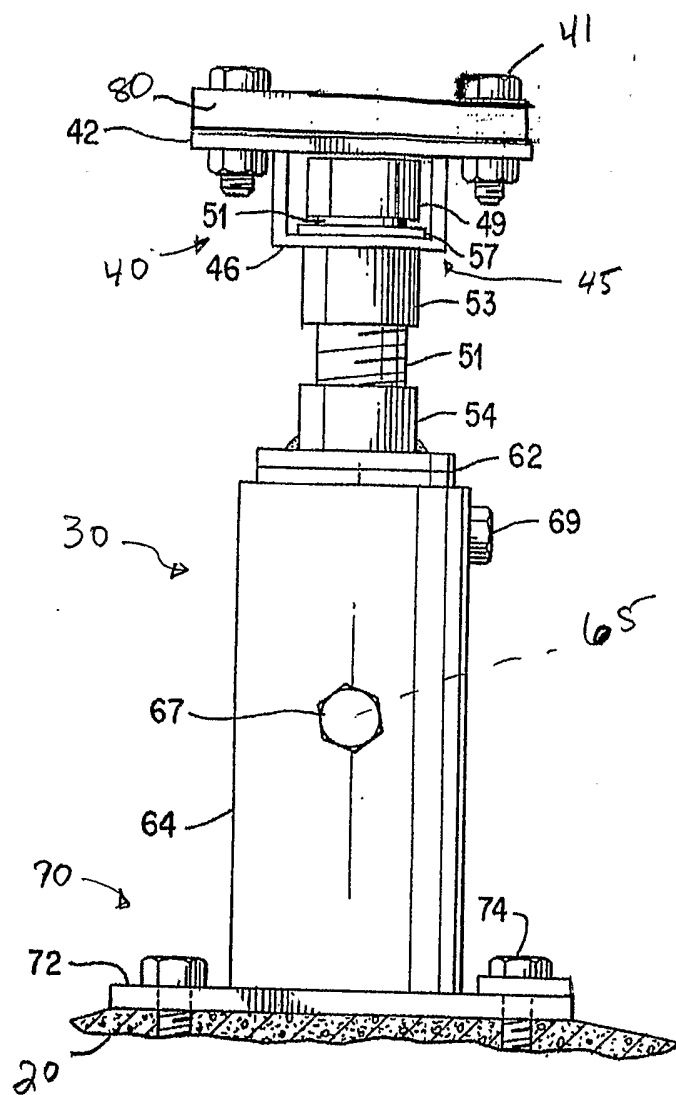


FIG. 2

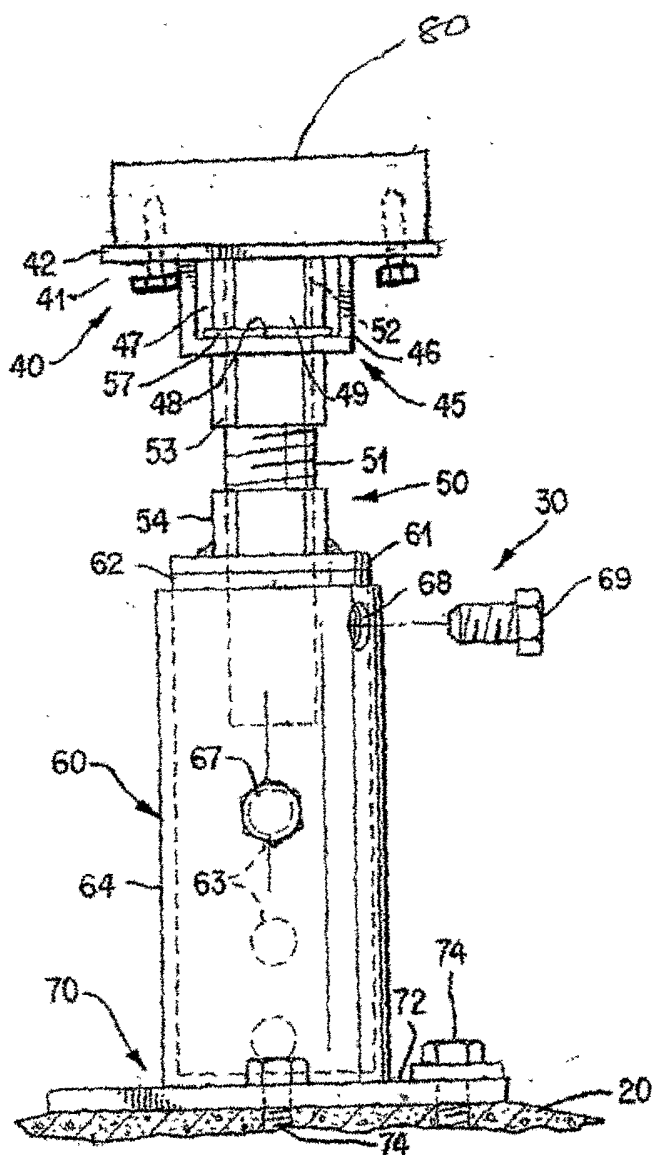


FIG. 3

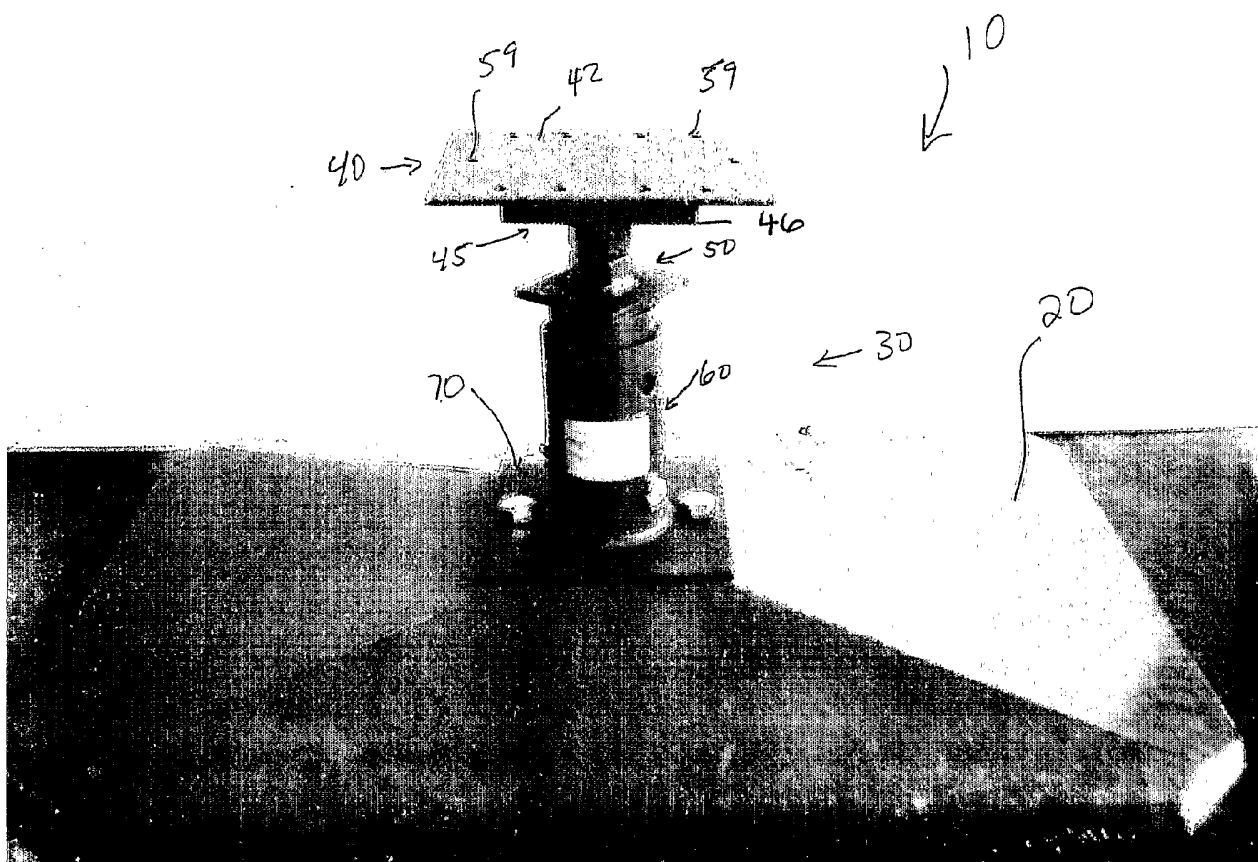


Figure 4A

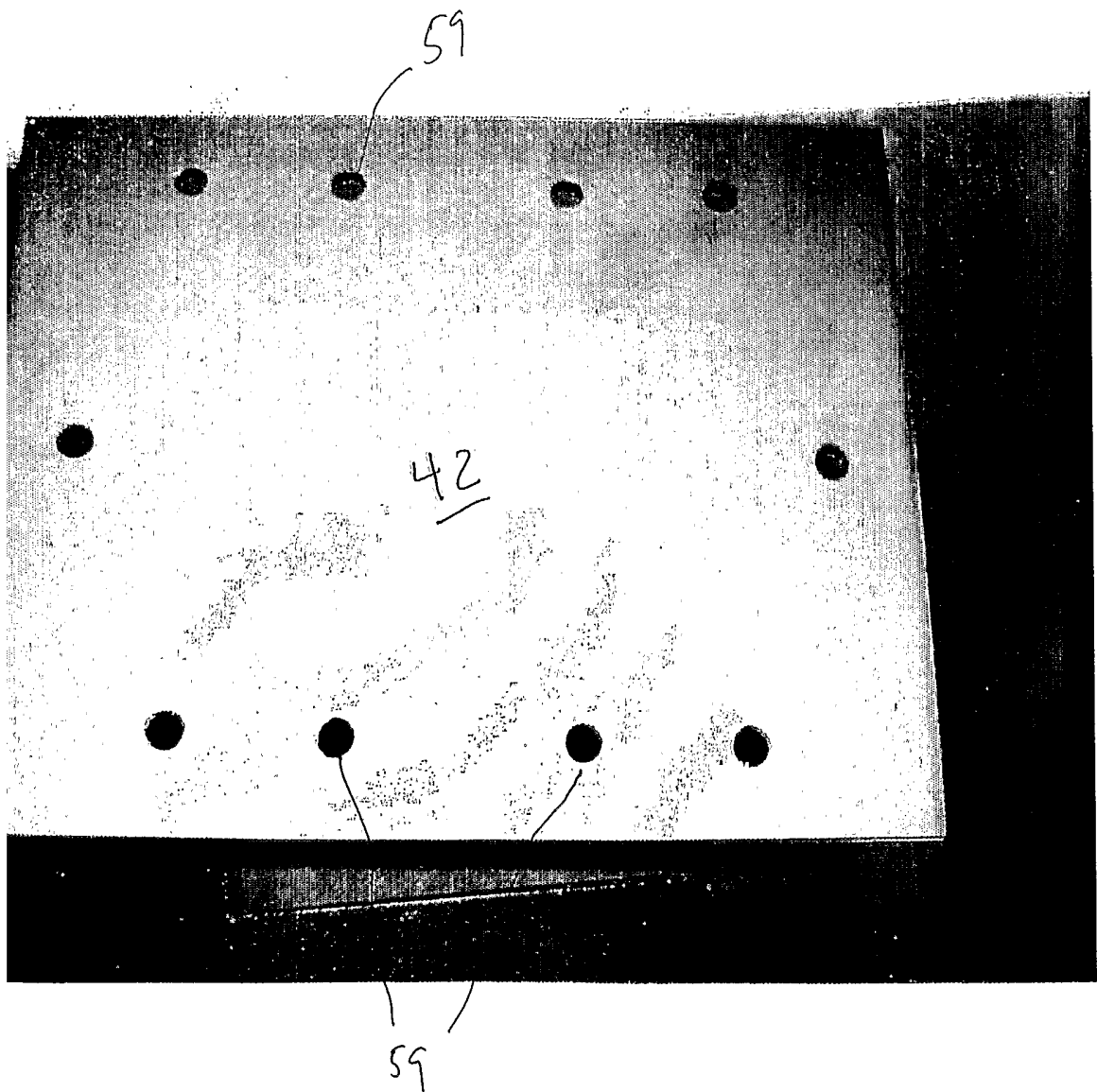


Figure 4B

FIG. 4C

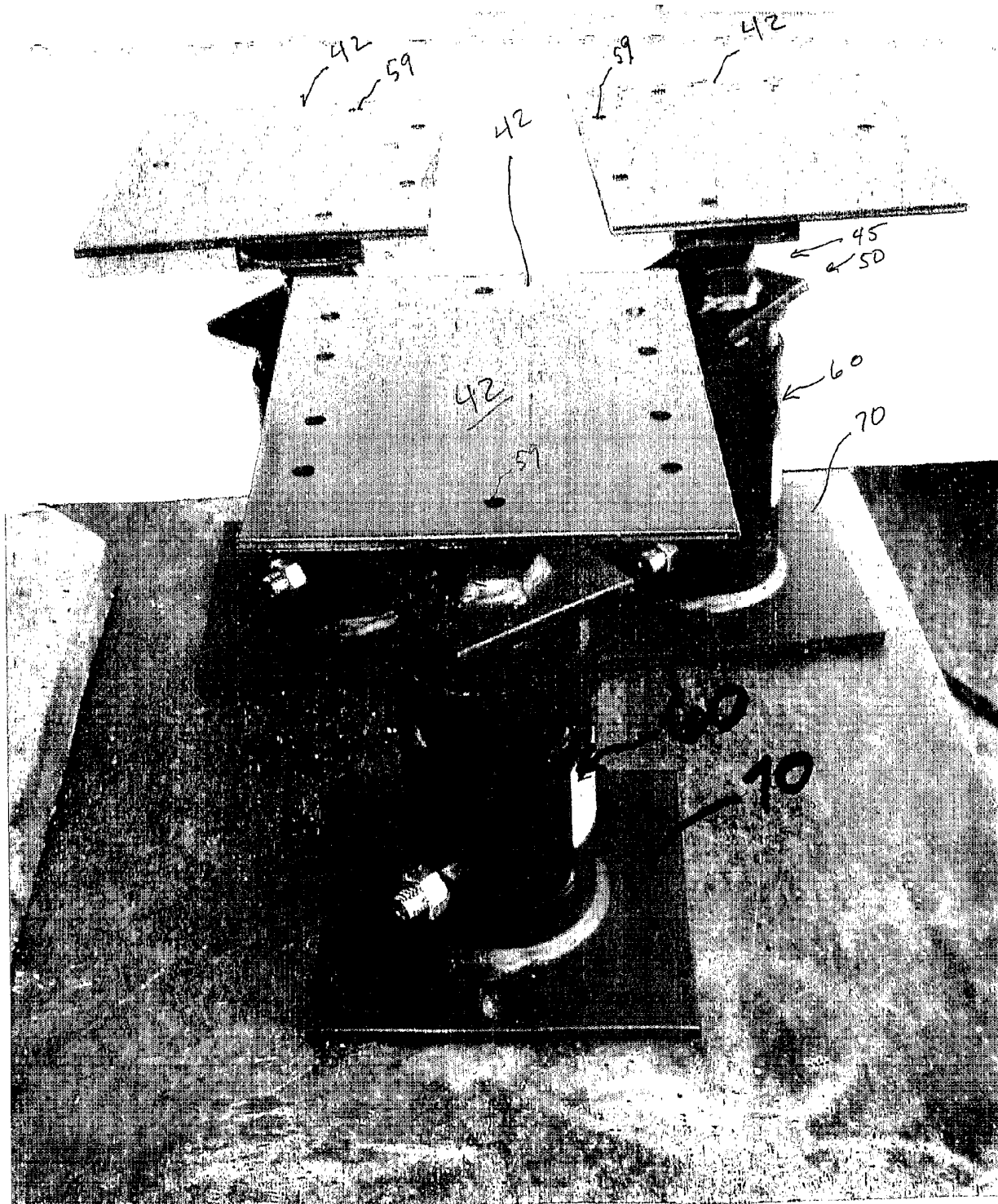


Figure 4D

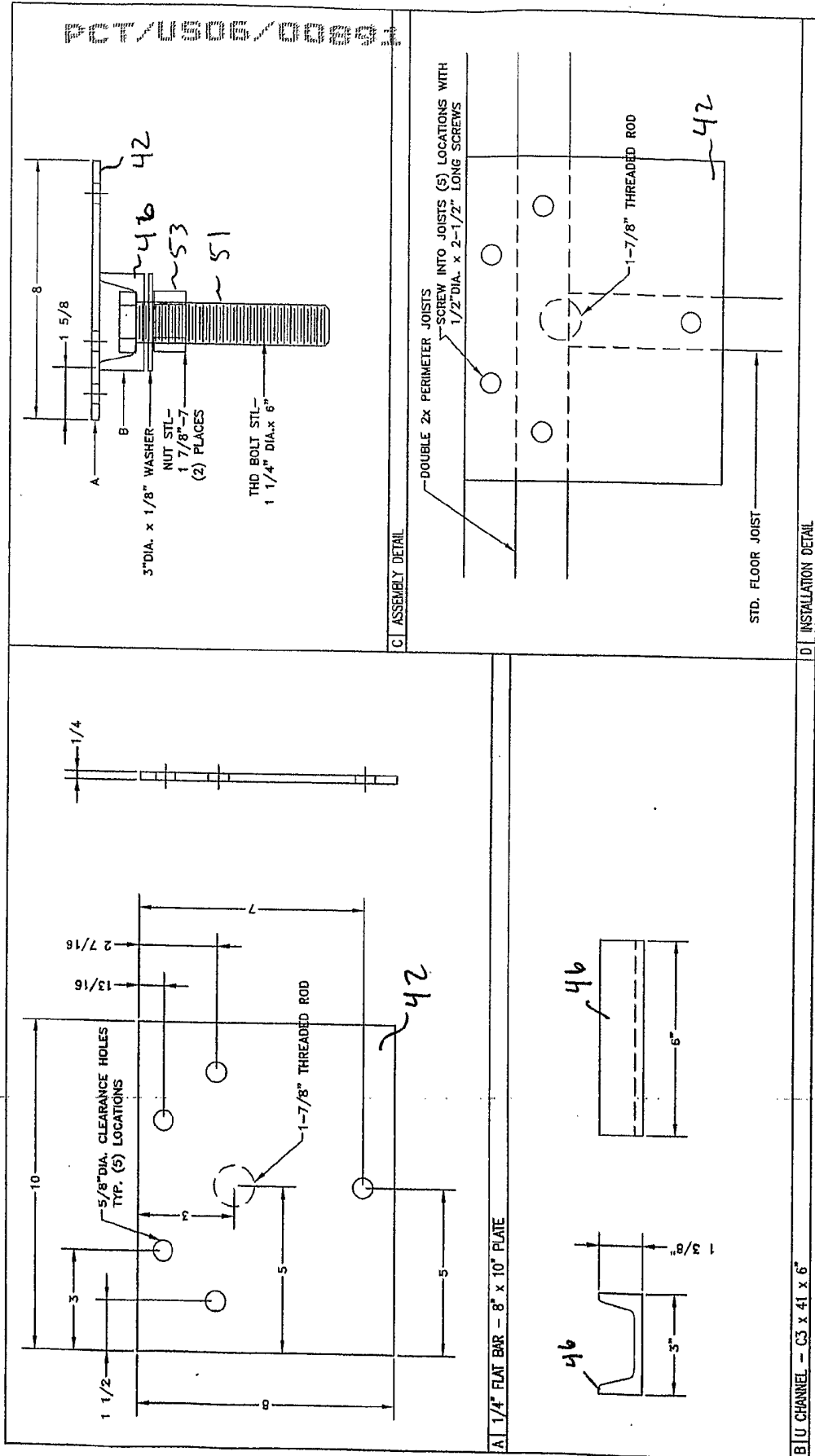


Figure 4E

