United States Patent [19]

Kutchai

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[45] **Nov. 26, 1974**

[54] **SHORING JACK**

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[22] Filed: **Mar. 29, 1972**

[21] Appl. No.: **239,099**

Related U.S. Application Data

[62] Division of Ser. No. 65,137, Aug. 19, 1970.

[52] **U.S. Cl.** ..... **248/354 S,** 52/637, 61/41 A, 254/98

[51] **Int. Cl.**..... **F16m 11/02,** B66f 3/08

[58] **Field of Search**..... 61/39 A, 41, 63; 248/354 S; 52/632, 637, 638, 645; 254/98, 13; 248/354

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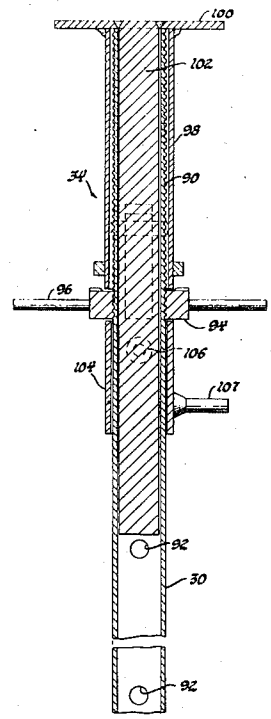
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Primary Examiner—Jacob Shapiro
Attorney, Agent, or Firm—Thomas N. Young

[57] **ABSTRACT**

A shoring system of the type having one or more vertically arranged frame sections and telescopic extension members extendable therefrom. A frame brace bar extends laterally between and is slidably connected to the extension members at the top of the frame section to provide lateral stability and to serve as an anchor point for diagonal braces to the extension members. Jack screws are disposed on the ends of the extension members and are provided with load-bearing sleeves which fit radially over the jack staffs and inner stabilizing shafts which extend telescopically into the jack staffs and are of a length greater than the length of the threaded portion of the jack staff.

2 Claims, 11 Drawing Figures



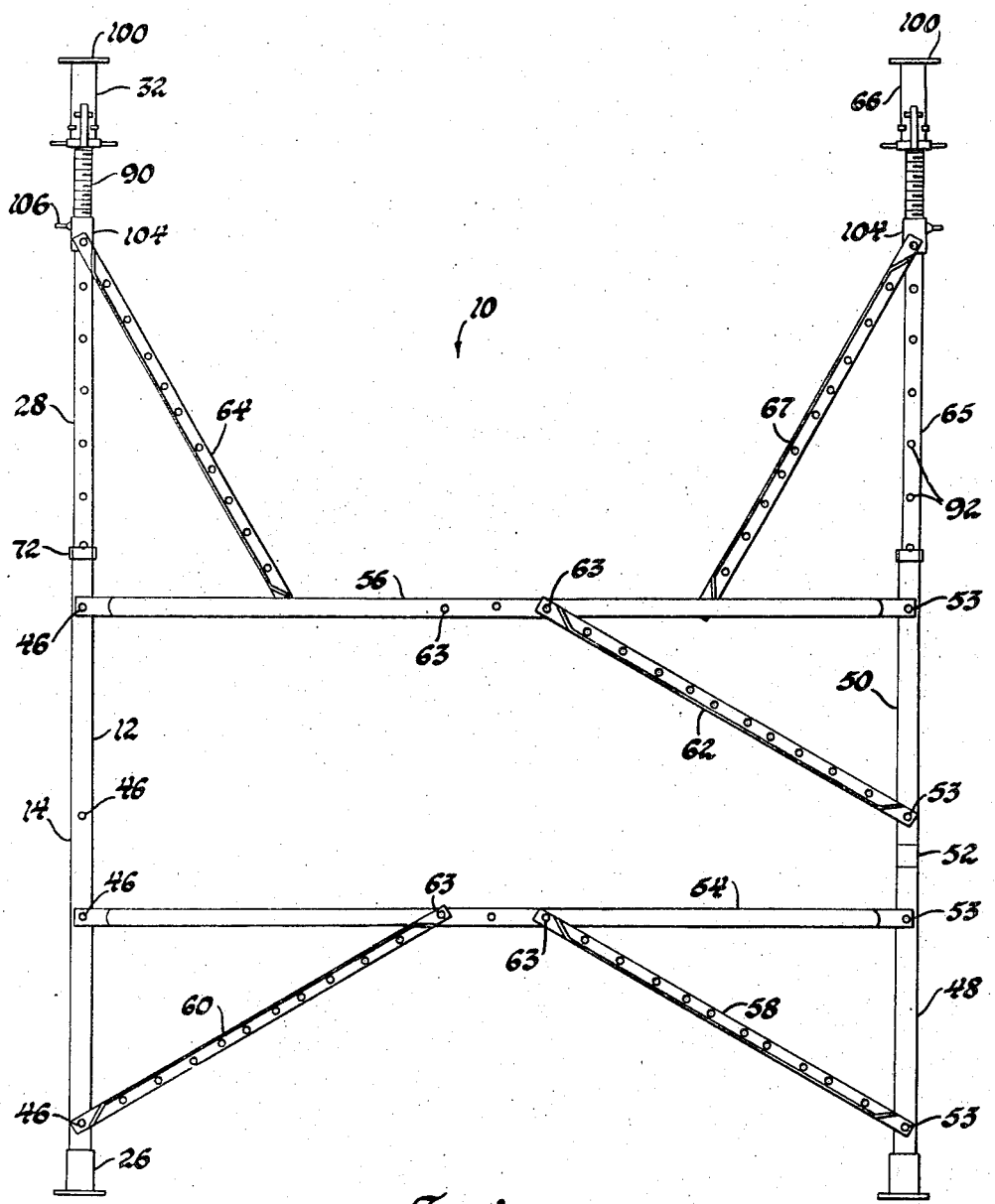

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46
63
64
63
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100
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58
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Fig. 1

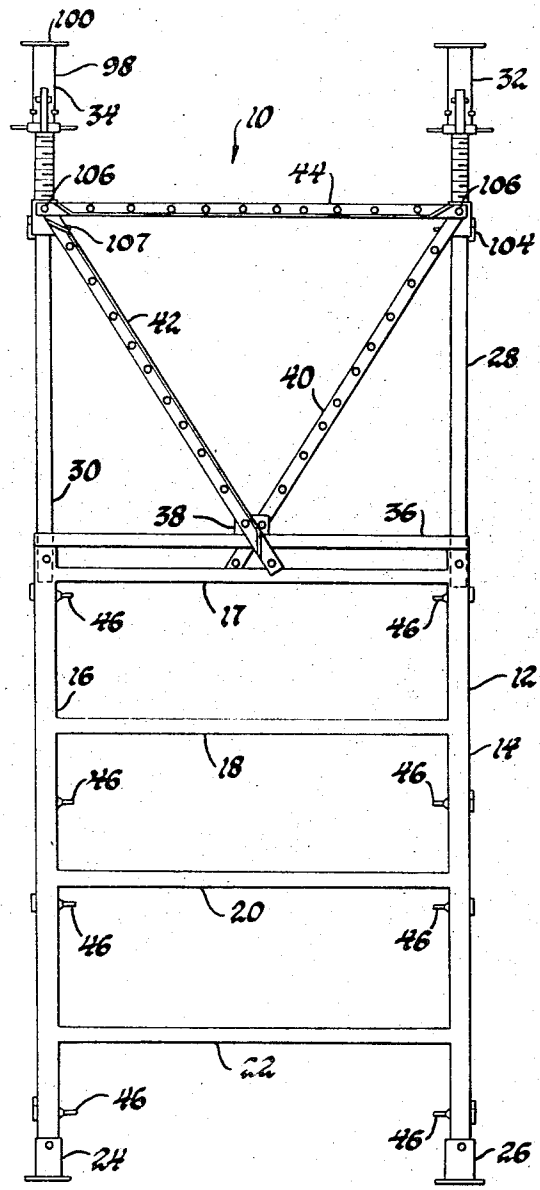

100
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34
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Fig.2

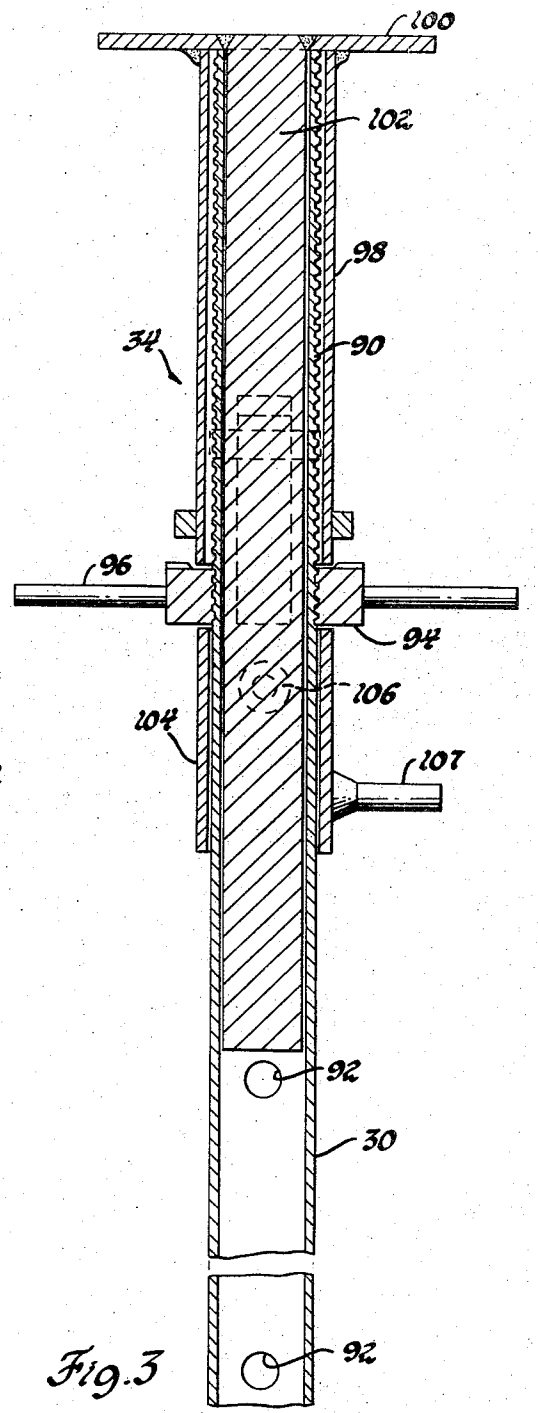

100
102
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34
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94
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92
30
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Fig.3

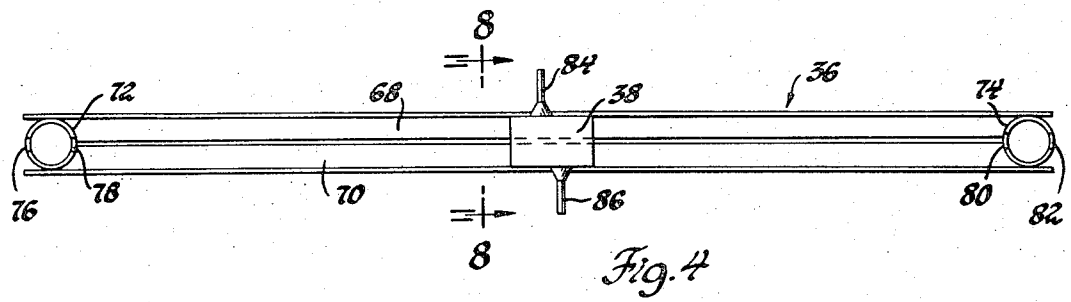


Fig. 4

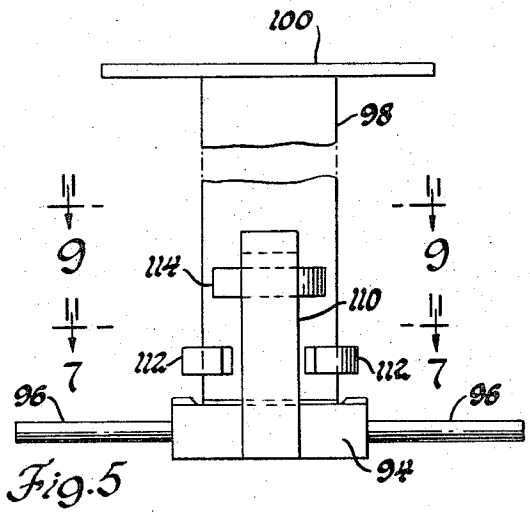


Fig. 5

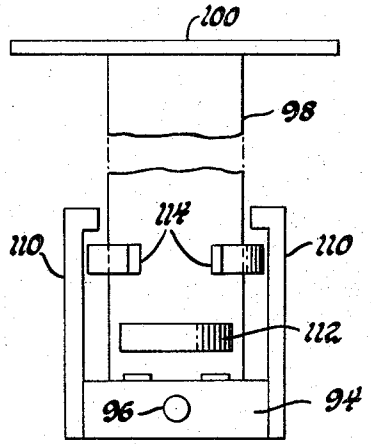


Fig. 6

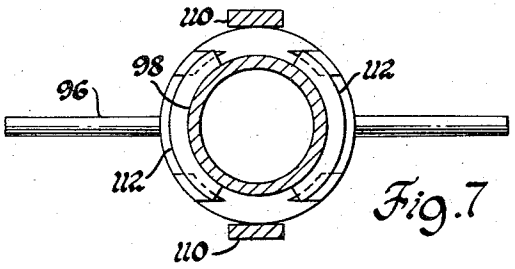


Fig. 7

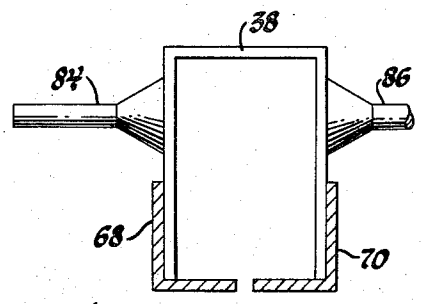


Fig. 8

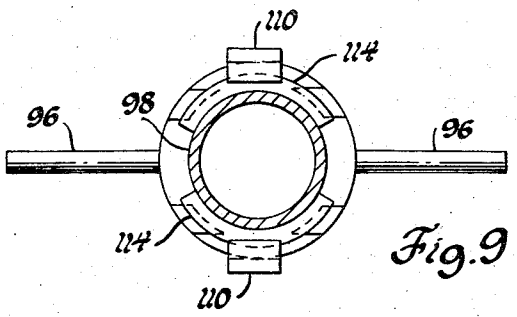


Fig. 9

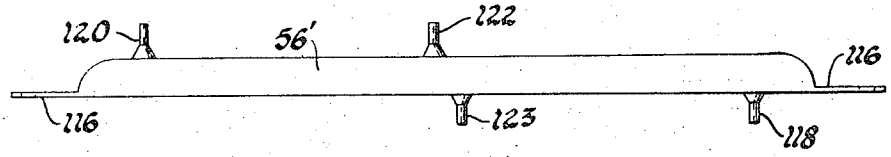

120
56'
122
116
116
123
118

Fig. 10

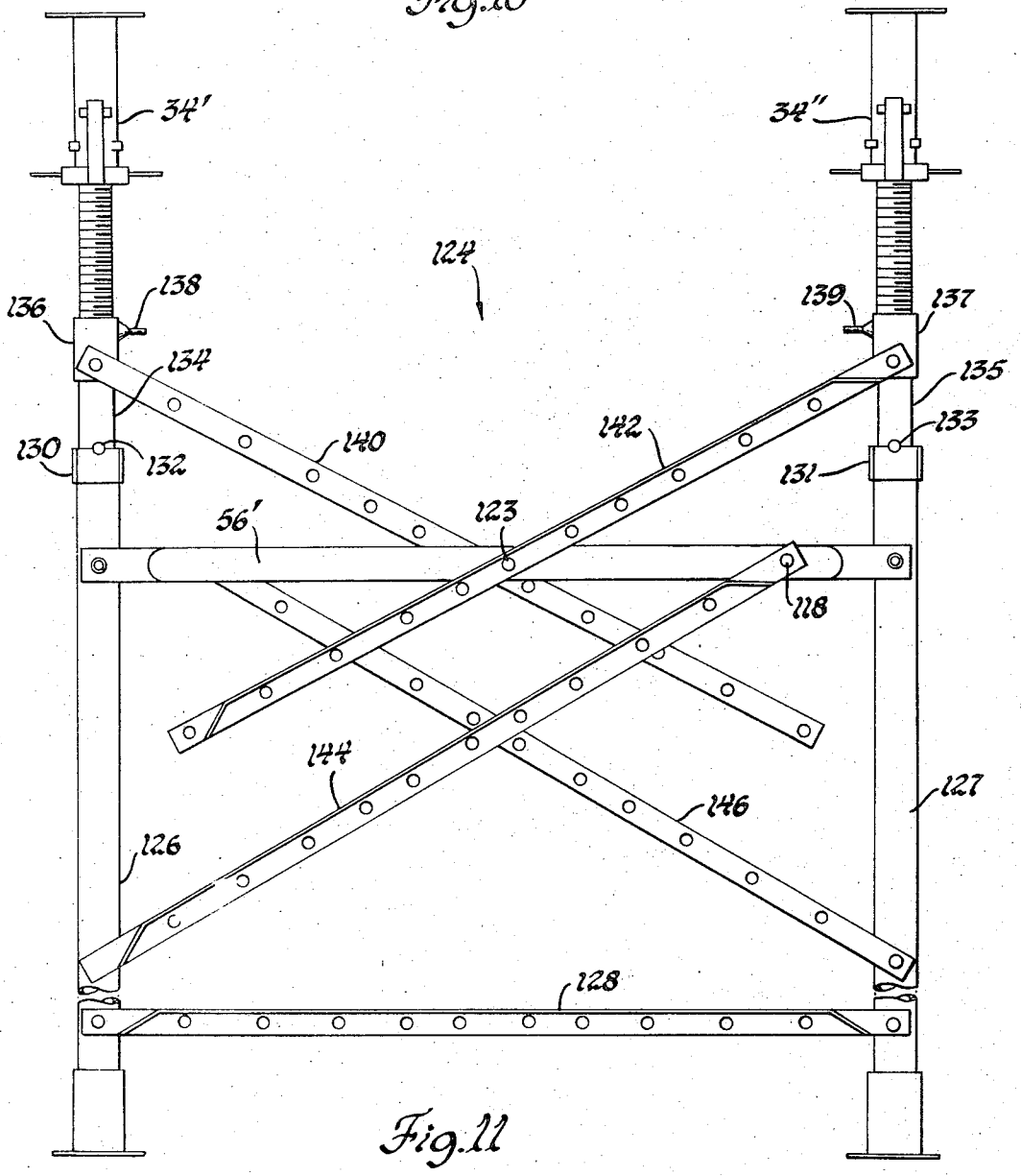

34'
34"
124
136
138
139
137
134
135
130
132
140
142
133
131
56'
123
118
144
146
127
126
128

Fig. 11

SHORING JACK

This application is a divisional of Ser. No. 65,137, filed Aug. 19, 1970.

This invention relates to shoring systems and the like and particularly to stabilizing structures for such systems.

Shoring systems are made up of vertically stacked frame sections at least the upper ends of which are vertically adjustable either by means of telescopic sections, jack screws, or both. A primary consideration in the design of such apparatus is lateral stability and various bracing techniques have been devised to provide such stability. Many such techniques, however, require that the equipment owner stock a large inventory of different sized parts such as braces and frames so that adequate stability can be provided in every shoring system configuration.

In accordance with the present invention, a shoring system is provided which features high lateral stability and a reduction in the number of different parts to be stocked. In general, this is accomplished by providing standardized bracing means for the extendable portion of a shoring system to eliminate the need for diagonal braces of many different lengths between the uprights of the frames and the extendable members.

In a first form the invention comprises at least one frame section having hollow uprights, extension members telescopically extendable relative to the uprights, and a frame brace bar slidably connected to and extending between the extension members at the telescopic junction thereof with the uprights. This frame brace bar provides lateral stability between the extension members, secures the extension members in the selected degree of extension, and, in a specific form, carries means by which standardized diagonal brace bars can be secured to the extended telescopic extension members.

Another feature of the subject invention is the provision of jack screws on one or both ends of the shoring system to provide a relatively large range of infinitely variable height adjustments. In general, this is accomplished by providing a hollow jack staff having a threaded portion which may be made relatively long, if desired, a threaded nut on the threaded portion for vertical travel thereover, a load-bearing sleeve bearing against the nut and extending over the staff to the end thereof, and an internal shaft which is fixed to the sleeve but extends vertically into the staff a distance greater than the length of the threaded section. This shaft extends internally of the jack staff and carries no tension or compression loads but provides lateral stability for the extended jack screw, thus, permitting exceptional extension thereof if desired.

Other features and advantages of the invention will be described herein including the matching or mating of full and half-size frame sections at laterally opposite sides of a shoring tower, the following specification to be taken with the accompanying drawings of which:

FIG. 1 is a side view of a shoring system embodying the invention;

FIG. 2 is an end view of the shoring tower of FIG. 1;

FIG. 3 is a detailed view of a jack screw assembly employed in the shoring system of FIG. 1;

FIG. 4 is a plan view of a frame brace bar employed in the shoring system of FIG. 1;

FIG. 5 is a side view of a portion of the jack screw assembly of FIG. 3;

FIG. 6 is another side view of the jack screw assembly;

FIG. 7 is a sectional view through the jack screw assembly;

FIG. 8 is a sectional view through the frame brace bar;

FIG. 9 is another sectional view through the jack screw assembly;

FIG. 10 is a plan view of a horizontal brace bar; and,

FIG. 11 is a side view of another shoring system.

Referring now to FIGS. 1 and 2, there is shown a shoring system 10 comprising a frame section 12 having a pair of hollow, parallel uprights 14 and 16 joined by laterally extending tubular members 17, 18, 20, and 22. The bottom ends of the uprights 14 and 16 are seated in base members 24 and 26 which are adapted to rest on any reasonably flat surface. Telescopically disposed within the uprights 14 and 16 are extension members 28 and 30 in the form of jack staffs having threaded upper ends and carrying jack screw assemblies 32 and 34, respectively. The jack screw assembly 34 which is representative is described in greater detail with reference to FIG. 3.

A frame brace bar 36 is disposed between the extension members 28 and 30 and slidably secured thereto to permit the extension members 28 and 30 to be vertically adjusted relative to the uprights 14 and 16. As better shown in FIG. 4, the frame brace bar 36 includes short tubular shore collars which slidably surround the extension members 28 and 30 and which otherwise merely rest on top of upper terminal ends of the uprights 14 and 16. Frame brace bar 36 contains a central support member 38 carrying studs 84 and 86, as better shown in FIG. 4, to receive and secure diagonal brace bars 40 and 42 which extend between the support member 38 and the extensionn members 28 and 30, respectively. A third brace bar 44 which is identical to the diagonal brace bars 40 and 42 extends between the extension member 28 and 30 at the lower ends of the threaded portions.

The brace bars 40, 42, and 44 are simply angle iron lengths of L-shaped cross-section having a plurality of spaced holes formed therein such that the bars may be secured to other shoring system elements by means of studs which fit into the holes in the bars. It will be observed in FIG. 1 that while the spacings between holes in the jack staffs are uniform, the spacings between the holes in the diagonal brace bars gradually decrease from the ends toward the centers in accordance with a trigonometric function such that as the extension members 28 are lowered into the uprights 14 causing the angle between the extension member 28 and the diagonal brace bar 40, for example, to increase, the diagonal brace bar 40 may still be secured to the support member 38 by means of the hole and stud arrangement. Uprights 14 and 16 are also provided with a plurality of inwardly extending studs 46 for the securement of horizontal brace bars, as shown in FIG. 1.

Referring now to FIG. 1, a side view of the shoring system 10 shows the frame 12 spaced oppositely from a pair of vertically stacked half-size frames 48 and 50 having an intermediate coupling pin 52 and a base 26. The half-size frame sections 48 and 50 are provided with a plurality of vertically spaced studs 53 to receive the ends of tubular horizontal brace bars 54 and 56 as well as diagonal, brace bars 58, 60, and 62, these brace bars again being made of angle iron stock. The horizon-

tal brace bars 54 and 56 are similarly provided with studs 63 which receive the other ends of the diagonal brace bars 58, 60, and 62, as shown. The diagonal brace bars 58, 60, and 62 are again identical to the brace bars 40, 42, and 44 of FIG. 2.

The frame section 48 and 50 are each made up of a pair of uprights similar to uprights 14 and 16 of the frame 12 in FIG. 2 and each of the uprights of the upper frame section 50 is provided with a telescopic extension member 65 in the form of a threaded jack staff having an upper jack screw assembly 66. Diagonal brace bars 64 and 67 are connected diagonally between the horizontal brace bar 56 and the stud collars 104 of the jack staffs 28 and 65, respectively, for lateral bracing purposes. Again, the diagonal brace bars 64 and 67 are identical to brace bars 58, 60, and 62 and all of the diagonal brace bars may, obviously, be interchanged in position with one another. The trigonometric function spacing of the holes in the diagonal brace bars 64 and 67 again permits the diagonal brace bars to be connected between the jack staffs 28 and 65 and the horizontal brace bar 56 in any of the height adjustments provided by the various pin holes in the jack staff as previously described.

For illustrative purposes, the dimensions of the shoring system elements shown in FIGS. 1 and 2 may be approximately as follows:

The height of a full-size frame section is 5 feet 11 inches.

The width of a frame section is 4 feet.

The length of a diagonal brace bar is 4 feet.

The length of a horizontal brace bar shown in FIG. 1 is 8 feet but may be any length required for frame spacing.

The length of a jack staff is 4 feet, 3 inches.

The length of the threaded portion of the jack staff is 10 inches.

FIGS. 4 and 8 show the frame brace bar 36 in greater detail to include a pair of elongated members 68 and 70 of L-shaped cross-section disposed in parallel and slightly spaced relation and secured such as by welding at the opposite ends thereof to shore collars 72 and 74 the inside diameters of which are selected to be equal to that of the frame section uprights 14 and 16 of FIG. 1. The outside diameters of shore collars 72 and 74 may be larger if desired. At the center of the frame brace bar 36 is a rectangular support member 38 having a generally box shape and secured, such as by welding, to the elongated frame brace bar members 68 and 70. Studs 84 and 86 extend outwardly from opposite sides of the support member 38 and are in slightly staggered relationship with one another considered axially along the longitudinal axis of the frame base bar 36 to restrict the connection of the diagonal brace bars 40 and 42 to respective sides of the assembly of FIG. 2. Semicircular notches 76 and 78 are formed along the longitudinal axis of the tubular shore collar 72 on the left side of the frame brace bar as shown in FIG. 4 to receive shore pins which extend through the holes in the jack staff 28, as shown in FIG. 1, for vertical adjustment purposes. Similar notches 80 and 82 are formed in the right hand tubular shore collar 74 of the frame brace bar 36, as shown in FIG. 4.

Referring now to FIGS. 3, 5, 6, 7, and 9, the details of the jack screw assembly 34 are shown in detail, it being understood the jack screw assembly 34 is representative of all of the jack screw assemblies shown in the drawings of FIGS. 1 and 2 and further that such similar jack screw assemblies may be employed on the bottom of the shoring system shown therein for accommodation of nonlevel support terrain.

Jack screw assembly 34 comprises the elongated, hollow, tubular jack staff 30 having a threaded upper portion 90 and a plurality of vertically spaced holes 92 formed therein. An annular nut 94 having internal threads is disposed on the threaded portion 90 of the jack staff 30 such that rotation of the nut 94 causes vertical travel thereof relative to the jack screw. A pair of handles 96 which project radially outwardly from the nut 94 are provided for manual manipulation. A load-bearing sleeve 98 fits over and coaxial with the threaded portion 90 of the jack staff 30 and is of a length approximately equal to the distance between the upper surface of the nut 94 and the end of the threaded portion 90, as shown in FIG. 3. Sleeve 98 rests on the upper end surface of the nut 94 and, thus, is caused to move vertically relative to the jack staff 30 along with the nut 94. Lugs may be provided on the nut to maintain the sleeve 98 in the centered position, if desired.

The upper end of the sleeve 98 is secured, such as by welding, to a flat plate 100 which provides a load-bearing surface at the upper end of the jack screw assembly. The center of the plate is further secured such as by welding to a solid shaft 102 which fits telescopically within the jack staff 30 and is of a length which is considerably longer than the length of the threaded portion 90 of the jack staff 30. The solid shaft 102 carries no compressive or tension forces when the plate 100 is loaded but serves to provide lateral stability in the jack screw assembly 34 particularly when the load-bearing sleeve 98 is fully extended.

To define the lower most position of the nut 94 relative to the jack staff 30 and also to provide a secure position for the securement of diagonal brace bars, a stud collar 104 is welded to the jack staff 30 so as to just abut the nut 94 when the nut is in the lowermost position. Stud collar 104 carries two laterally extending studs 106 and 107 to receive the diagonal brace bars 40 and 44 for example, as shown in FIG. 2 and brace bars 64 and 67, as shown in FIG. 1. An additional pin at a position 90° from the first pin 106 is also provided to receive the diagonal brace bar 67 for example, as shown in FIG. 1.

Means are provided in the jack screw assembly of FIGS. 5 and 6 for preventing the load-bearing sleeve and the plate 100 from sliding off inadvertently from the jack staff 30. This antiremoval means comprises a pair of L-shaped fingers 110 which are secured to and project vertically upwardly from the nut 94. The inwardly projecting ends of the fingers 110 are closely spaced relative to diametrically opposite points on the load-bearing sleeve 98, as shown in FIG. 6. A first set of lugs 112 is disposed on the bottom end of the sleeve 98, as shown in FIG. 5, at diametrically opposite positions and the second set of lugs 114 is spaced upwardly therefrom and at a 90° rotational position from the first set of lugs 112. Accordingly, the upper lugs 114 interfere first with the inwardly projecting ends of the fingers 110 and require a 90° rotation of the sleeve 98 before the first increment of axial removal displacement is permitted. At this time the second set of lugs 112 interferes with the inwardly projecting ends of the fingers 110 and another 90° of rotation is required before removal can be completed.

In a typical example of useage two frames of the same size or a full-size frame section 12 and two half-size frame sections 48 and 50 are assembled together by means of horizontal brace bars 54 and 56 to form a four-legged rectangular shoring tower, as best shown in FIG. 1. Additional four-legged assemblies may be disposed on top of one another until the proper height is reached. At the top of the uppermost frame section, a jack staff 30 is telescopically disposed into each of the uprights after first having disposed a frame brace bar 36 between the uprights of the frame section. The jack staff slides through first the tubular shore collar 72 at the outer end of the frame brace bar 36 and then telescopically through the hollow tubular portion of the upright 12. A shore pin is inserted through the hole 92 in the jack staff whenever the proper height adjustment has been reached. Diagonal brace bars 64, 58, 60, 62, 40, 42, and 44 are placed in position by means of the studs on the various elements and the holes in the diagonal brace bars. The jack screw assemblies 34 are then adjusted to the proper height, the internal shafts 102 providing lateral stability irrespective of the height adjustment of the jack screw assembly.

FIG. 10 is a plan view of a horizontal brace bar 56' similar to but shorter than the horizontal brace bar 56 of FIG. 1. The bar 56' is preferably made from tubular stock so as to be substantially rigid and having flat end portions 116. Holes are formed in end portions 116 to accept studs for connection between frames as shown in FIG. 11. Studs 118 and 120 are disposed adjacent opposite ends of bar 56' and extend in opposite directions to secure diagonal brace bars to opposite sides thereof. In addition, studs 122 and 123 are disposed centrally of bar 56', extending in opposite directions and slightly longitudinally offset for reasons to be described.

Referring to FIG. 11, a shoring system 124 is shown to comprise spaced parallel frame sections 126 and 127 of equal height. The sections 126 and 127 are interconnected adjacent the upper ends thereof by the horizontal brace bar 56' and adjacent the lower ends thereof by a diagonal brace bar 128. Suitable studs are provided on the frame section uprights as was the case in FIG. 1.

Resting on the upper ends of frame sections 126 and 127 are shore collars 130 and 131 which cooperate with shore pins 132 and 133 to secure extension members 134 and 135 telescopically within the uprights of the frame sections at the desired heights. Jack screw assemblies 34' and 34'' are disposed on the upper ends of the extension members 134 and 135 and are of the type illustrated in FIG. 3. Stud collars 136 and 137 are welded to extension members 134 and 135 and carry studs 138 and 139, respectively.

For bracing purposes, diagonal brace bars 140 and 142 are connected between the horizontal brace bar 56' and the stud collars 136 and 137, respectively. Additional diagonal brace bars 144 and 146 are connected between horizontal brace bar 56' and the uprights of frame sections 126 and 127, respectively. Diagonal brace bar 140 is connected to the rear-facing center stud 122 of horizontal brace bar 56' while diagonal brace bar 142 is connected to the front-facing stud 123. Because of the offset between the studs 122 and 123, the spacing between stud collar 137 and stud 123 is such as to accept a diagonal brace bar 142 whereas the spacing between stud collar 136 and stud 123 will not accept the diagonal bar. This exclusive bar position connector design precludes the attachment of the diagonal brace bars 140, 142, 144, and 146 in such an arrangement as to produce mechanical conflict between the diagonal brace bars as the extension members 134 and 135 are lowered.

To clarify this point, it can be seen that in the position of FIG. 11, diagonal brace bars 142 and 146 cannot be connected on the same side of horizontal brace bar 56' or they would lie in the same vertical plane and conflict. In the fully raised configuration of members 134 and 135 the bars would not conflict, but the mistake would be realized if it became necessary to lower and rebrace the extension members. The stud offset precludes this misconnection in the first instance. The offset also appears between studs 84 and 86 for uniformity. The length of diagonal brace bar 142 is such that as member 135 is raised, the lower end of bar 142 describes and arc which at all points is vertically clear of bar 144 so as to avoid conflict. Again, bars 140, 142, 144, and 146 are all identical to each other and to bars 40, 42, and 44 of FIG. 2.

It is to be understood that the foregoing description is illustrative in character and is not to be construed in a limiting sense.

I claim:

1. A jack screw assembly for use in a shoring system comprising a hollow jack staff having a threaded portion, a nut on the threaded portion for vertical travel thereover, a load-bearing sleeve bearing against the nut, and extending over the jack staff to the end thereof, and an internal shaft fixed to the sleeve but extending vertically into the jack staff a distance greater than the length of the threaded portion.

2. Apparatus as defined in claim 1 including means to prevent axial displacement of the sleeve and shaft relative to the nut except when the sleeve and shaft occupy a predetermined angular position.

* * * * *