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Hansen et al.

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[45] **Apr. 1, 1975**

[54] **SUPPORT BRACE FOR WALLS AND THE LIKE**

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[21] Appl. No.: **444,812**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 259,011, June 2, 1972, abandoned

[52] **U.S. Cl.** ..... **248/354 S,** 52/149, 52/703, 52/749, 248/357

[51] **Int. Cl.** **E04g 25/04,** F16m 11/28

[58] **Field of Search** ..... 248/354 R, 354 S, 355, 248/351, 357; 52/149–151, 703, 747, 749, 712–714, 127; 249/40–43, 213–217

[56] **References Cited**

UNITED STATES PATENTS

347,211	8/1886	Towberman	52/149
1,178,641	4/1916	Henkel	52/151
1,662,152	3/1928	Logg	248/354 S
1,779,908	10/1930	Graziano	249/43
2,752,774	7/1956	Steinboeck	52/712
2,887,757	5/1959	Miles	52/703
3,006,592	10/1961	Davis	248/354 S
3,161,395	12/1964	Carter	248/354 S
3,330,421	7/1967	Simmons	248/354 S
3,474,997	10/1969	Hinrichsen	248/354 R
3,625,470	12/1971	Shoemaker	249/214
3,765,543	10/1973	Thomas	52/173
3,817,006	6/1974	Williams	52/122

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Attorney, Agent, or Firm—Olson, Trexler, Wolters, Bushnell & Fosse, Ltd.

[57] **ABSTRACT**

A support brace for freshly constructed brick walls and the like is provided, and a method for installing and using the same is described. Should the brace foot plate tend to sink into the underlying ground or to slip away from the wall, the attached buttress brace automatically extends to accommodate this movement. Wind or other forces tending to topple the wall are resisted by the stiff buttress brace and associated brace elements. The buttress brace can be extended or retracted over relatively large distances by gross adjustment means including a ratchet and rack mechanism. The buttress brace can be extended or retracted over short distances with great precision by a fine adjustment means including a turnbuckle mechanism.

6 Claims, 16 Drawing Figures

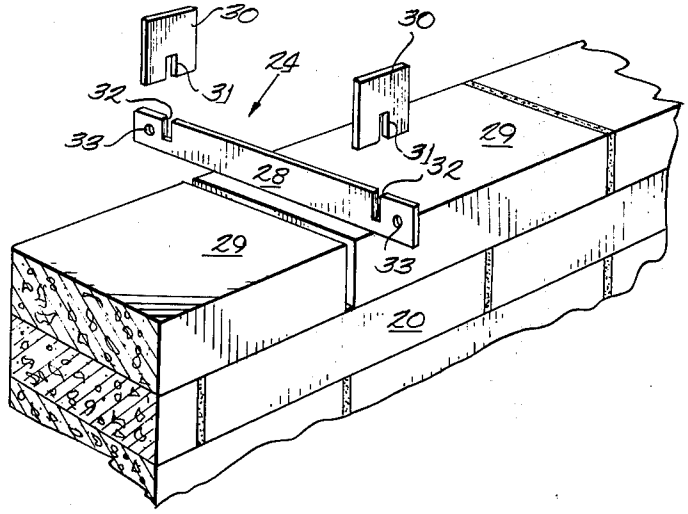


Fig. 1.

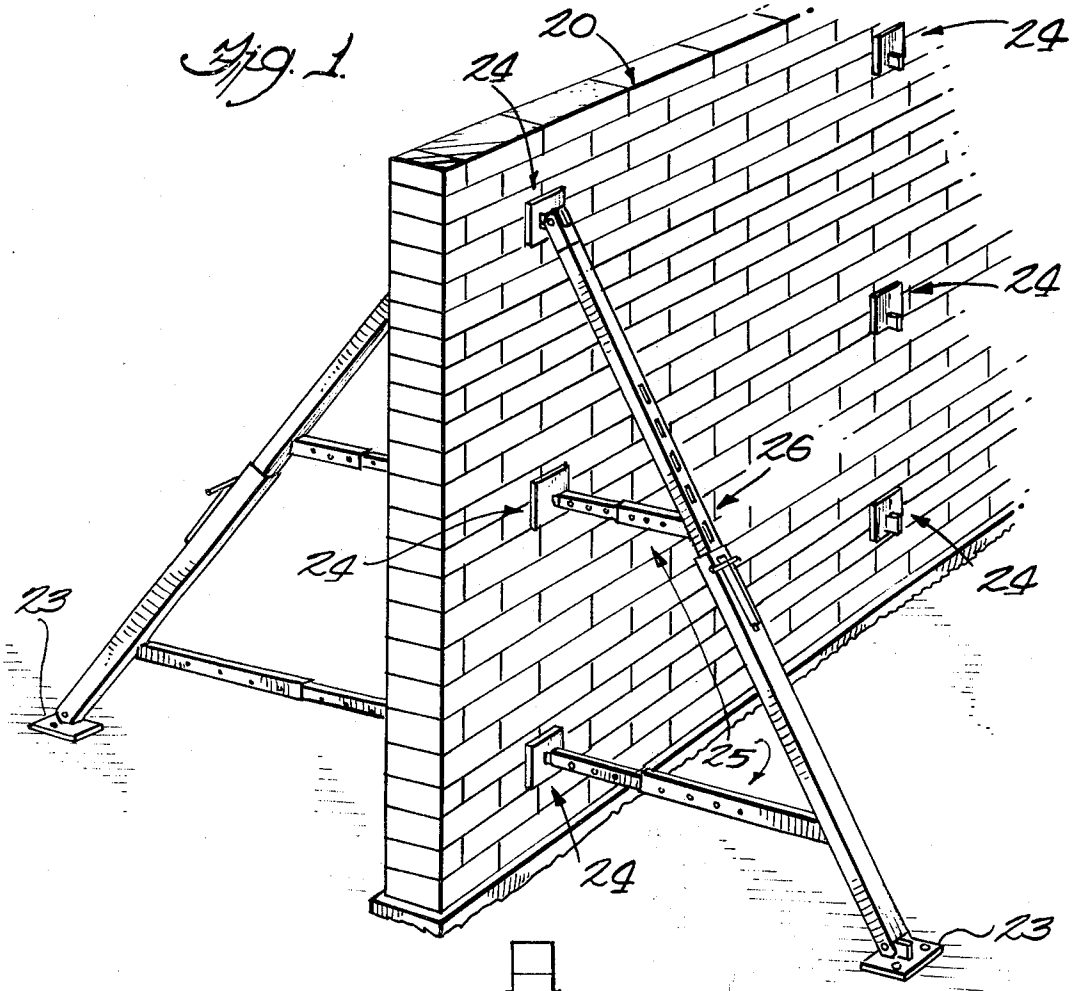

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Fig. 2.

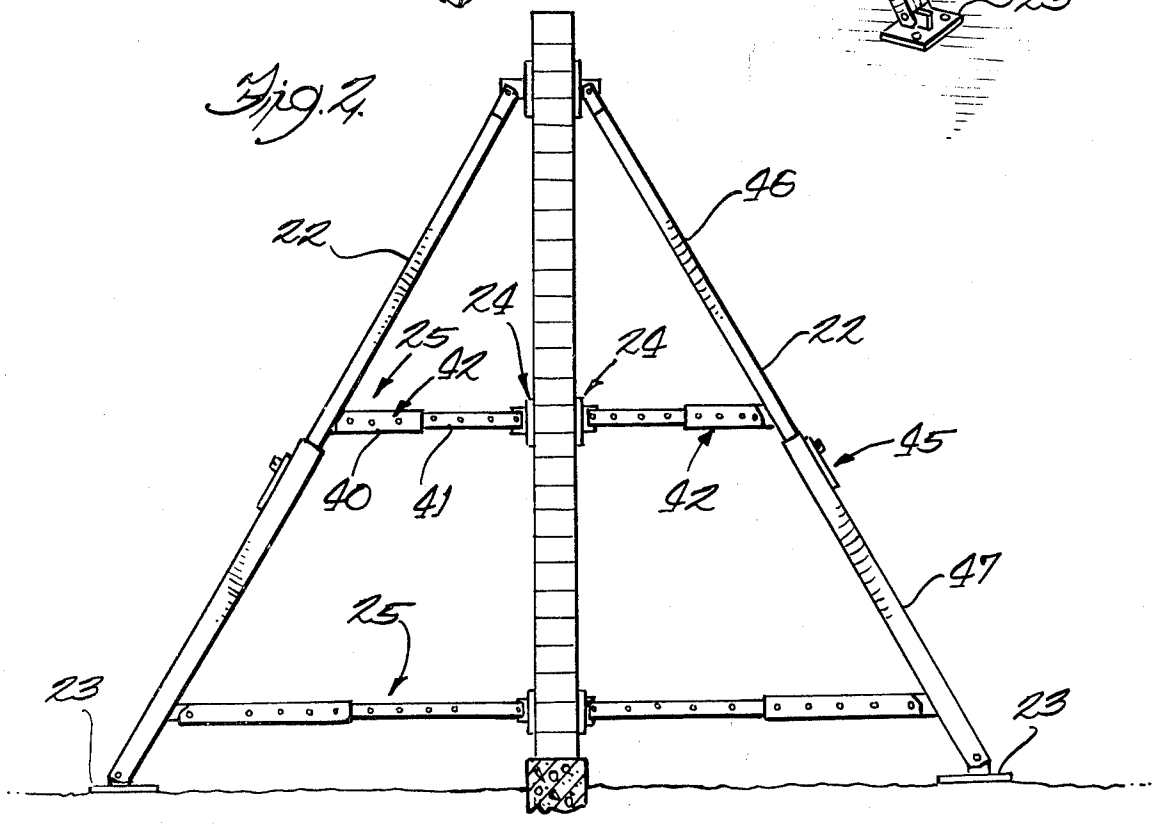

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Fig. 3.

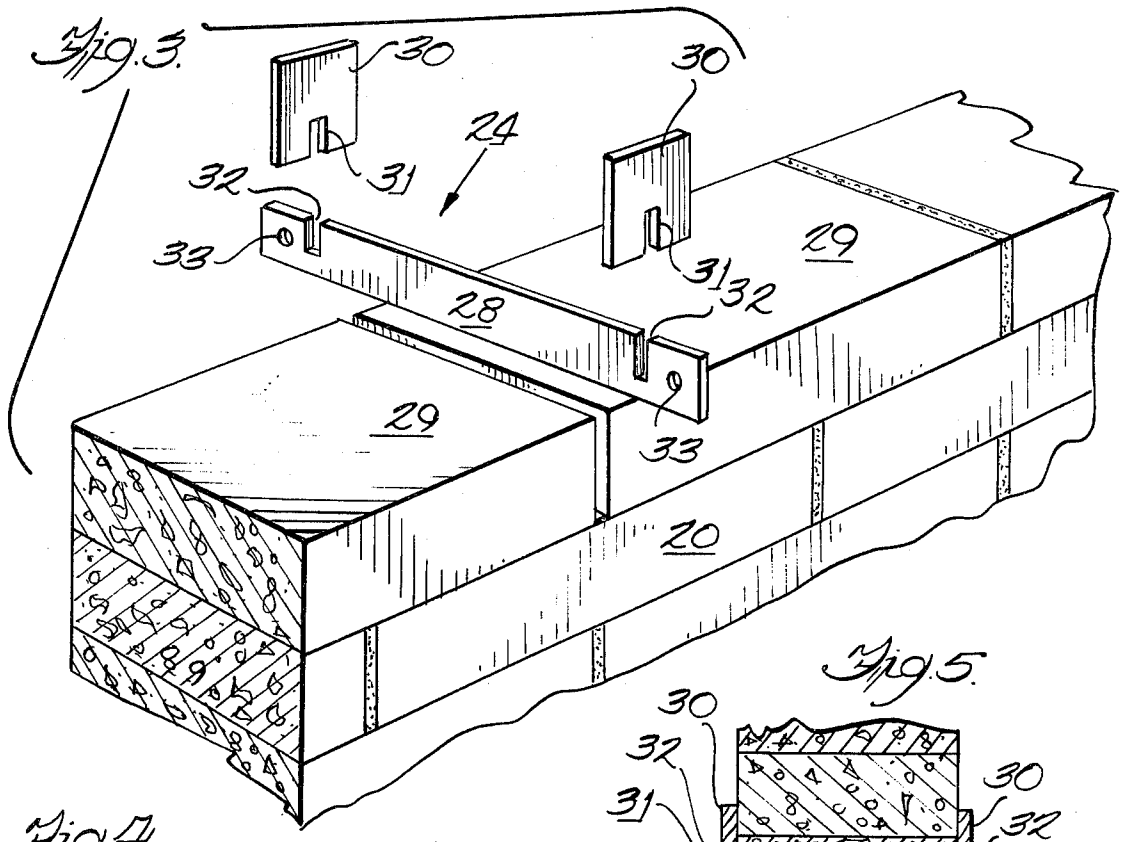


Fig. 5.

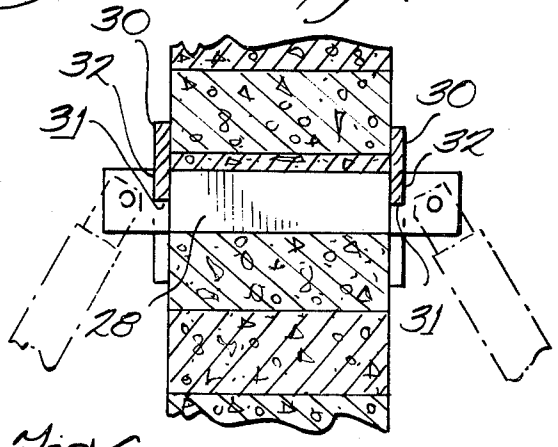


Fig. 4.

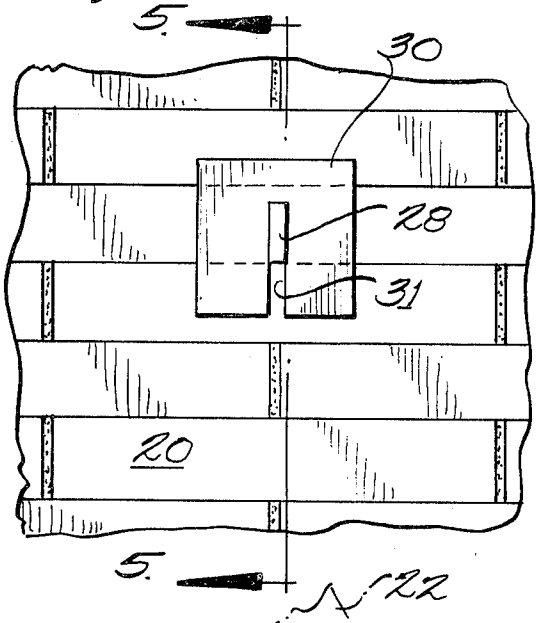


Fig. 6.

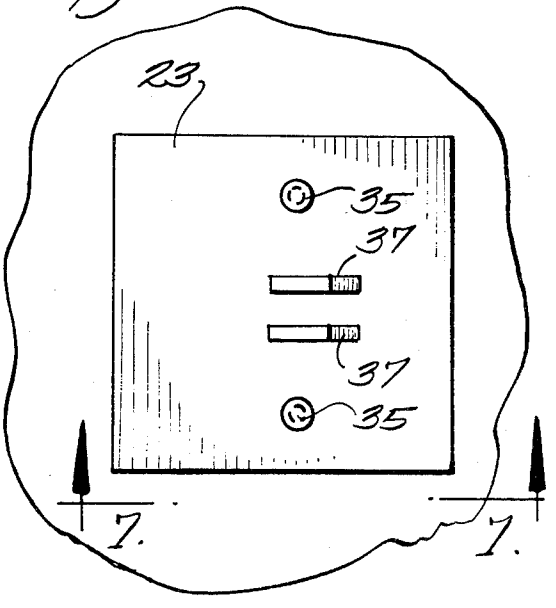


Fig. 7.

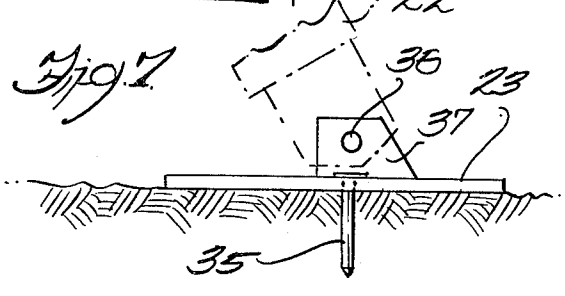


Fig. 8.

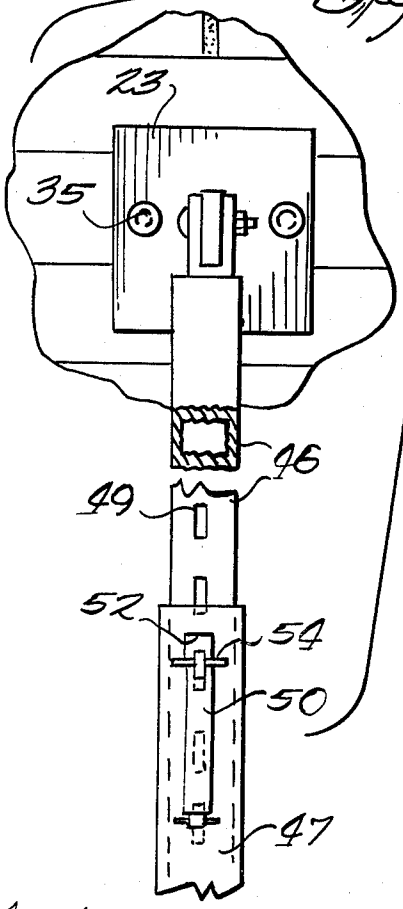


Fig. 9.

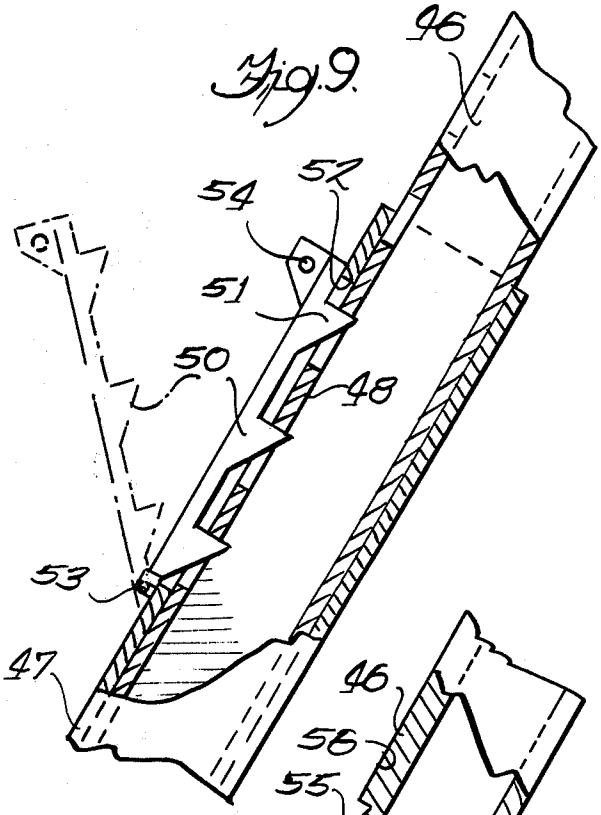


Fig. 10.

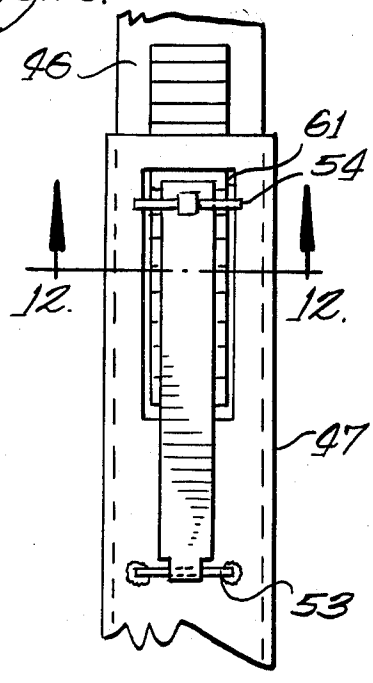


Fig. 11.

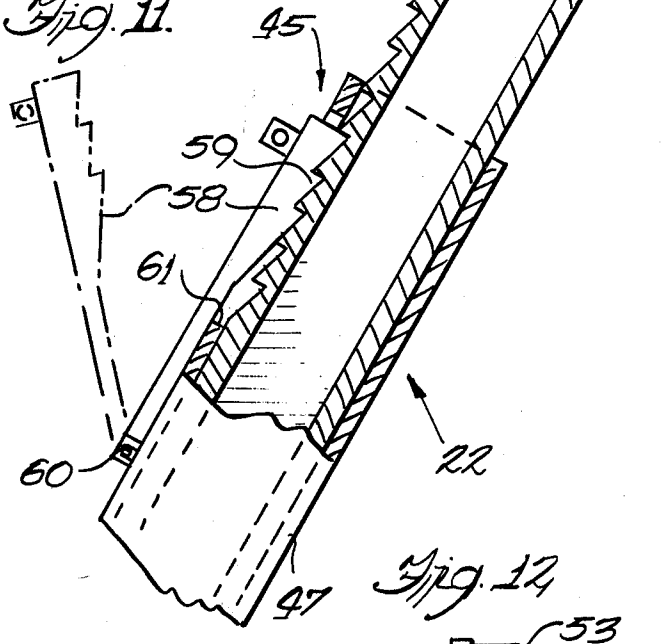
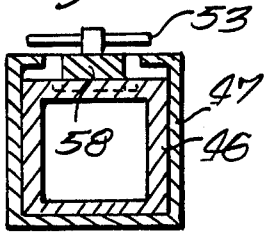


Fig. 12.



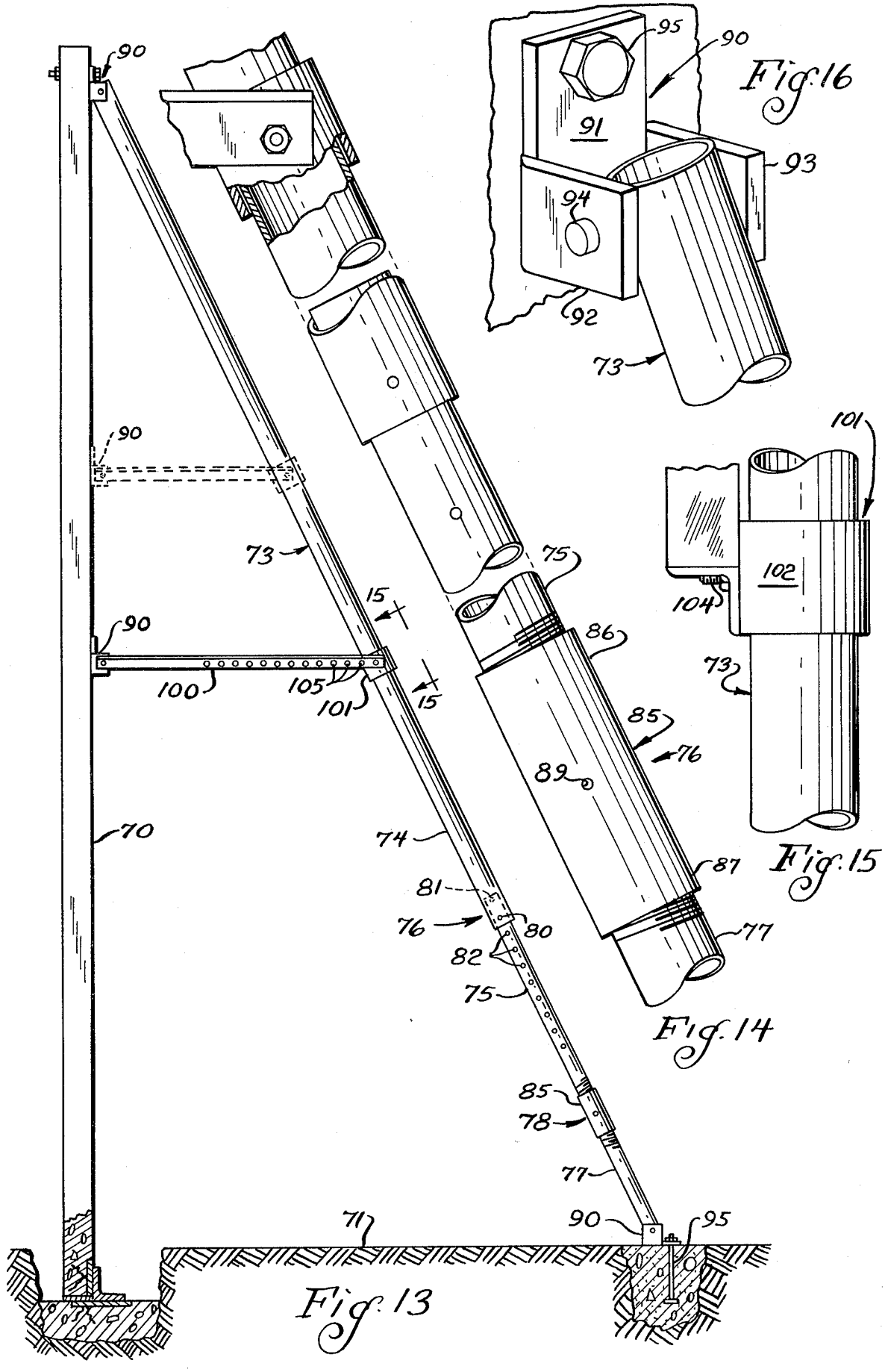


Fig. 13

Fig. 14

Fig. 15

Fig. 16

SUPPORT BRACE FOR WALLS AND THE LIKE

CROSS-REFERENCE TO RELATED CASE

This application is a continuation-in-part of application Ser. No. **259,011,** filed June **2, 1972,** now abandoned.

BACKGROUND OF THE INVENTION

This invention relates generally to temporary wall braces and more particularly concerns a wall brace apparatus which automatically adjusts itself to keep the supported wall in an upright position.

When brick and mortar walls are freshly erected, the component bricks and wet mortar provide relatively little lateral strutural resistance to wind or other toppling forces applied against the wall face. Consequently, these walls may be easily blown over or otherwise toppled before the mortar hardens or before the wall is laterally supported by adjacent permanent structure such as intersecting walls or roofing structure.

Consequently, it has long been a desirable procedure to support such freshly erected walls with temporary bracing until the wall mortar hardens or until adjacent supportive structure is constructed or installed. Such temporary bracing must be of relatively low cost, of course, and should provide continual supportive pressure upon the wall when necessary until the wall mortar has firmly set or until the additional supportive structure is completed.

Unfortunately, such bracing requirements are not always met by the use of scrap timber or other expedient bracing constructions. Earth work or other surrounding foundation surfaces are often wet, owing to natural causes or construction efforts, and may provide an unstable foundation for the braces. Under such conditions, footings for temporary bracing structure may slip away from the wall, or may sink into the ground upon which they are placed, thereby leaving the bracing structure simply leaning against the freshly constructed wall and providing no support.

Further, expedient scrap timber constructions may be expensive since the wooden supports can generally be used only once or at most a very few times. They are heavy and bulky, and it is usually not economical to transport them from job site to job site. Metal bracings previously offered have required heavy components, and have proved to be expensive, since the bracing parts were easily damaged by rough handling or by dirt and foreign objects fouling the connecting mechanisms. Several of these metal bracings, like the expedient wooden bracing devices, could not be easily adjusted to accommodate sinking or sliding brace footings.

The objects and the advantages of the present invention in overcoming these problems will become apparent upon reading the following detailed description and upon reference to the drawings, in which

FIG. **1** is an overall perspective viewing showing the novel bracing embodying the present invention supporting a newly constructed brick wall or like structure;

FIG. **2** is an elevational view showing the novel bracing structure and the supported wall structure;

FIG. **3** is a fragmentary perspective view showing in further detail the supported wall structure and a typical wall anchor in exploded relation;

FIG. **4** is a side elevational view showing the supported wall structure face and the wall anchor emplaced in and on the wall;

FIG. **5** is a sectional view taken substantially in the plane of line **5—5** in FIG. **4** and showing in further detail the wall anchor structure emplaced in and on the wall;

FIG. **6** is a plan view showing in further detail the brace footing or foot plate and associated structure;

FIG. **7** is an elevational view taken substantially in the plane of line **7—7** in FIG. **6** and showing in further detail the foot plate, the underlying earth or other brace foundation, and the buttress brace attached to the foot plate;

FIG. **8** is a fragmentary plan view showing in further detail the brace foundation, the foot plate, and the attached buttress brace;

FIG. **9** is a side elevational view showing, in cutaway, the buttress brace and an associated adjusting rack and ratchet mechanism;

FIG. **10** is a plan view similar to FIG. **8** but showing in further detail the arrangement of the buttress leg portions, the rack, and the ratchet;

FIG. **11** is a side elevational view similar to FIG. **9** showing an alternate construction of the rack and ratchet mechanism;

FIG. **12** is a sectional view taken substantially in the plane of line **12—12** in FIG. **10** showing in further detail the arrangement of extensible buttress leg portions, rack, and ratchet;

FIG. **13** is an elevational view showing a modified form of the bracing structure;

FIG. **14** is a fragmentary side elevational view showing details of the buttress brace parts;

FIG. **15** is a side view taken substantially in the plane of line **15—15** in FIG. **13** showing the slip collar interconnecting the buttress brace and a stiff arm; and

FIG. **16** is a perspective view showing the interconnection between the buttress brace top and the side wall.

DETAILED DESCRIPTION

While the invention will be described in connection with a preferred embodiment and procedure, it will be understood that it is not intended to limit the invention to that embodiment or procedure. On the contrary, it is intended to cover all alternatives, modifications and equivalents as may be included within the spirit and scope of the invention.

Turning first to FIG. **1** there is illustrated a wall structure **20** which may be of the brick and mortar type, and a surrounding horizontal surface **21,** which may be considered to be of earth or other material. For supporting the wall in its erected position, there is provided a novel bracing structure **22,** comprising, in general, foot plate elements **23,** wall anchor structures **24,** and interconnecting stiff arm members **25** and buttress brace devices **26.**

It is a feature of the invention that the novel bracing structure may be attached to both sides of the wall, if desired. To this end, the wall anchor means **24** illustrated in FIGS. **1–5** includes a cross-wall anchor stud **28** formed and adapted to extend through the wall between adjacent bricks **29.** To securely retain the anchor stud **28** in the wall, two anchor face plates **30** are provided with slots **31** formed to interlock with mating slots **32** in the anchor stud **28.** Eye holes **33** are formed

in the anchor stud **28** to connect the anchor means **24** with the stiff arms **25** and buttress braces **26.**

These anchor support devices **24** are installed in a vertical array at any convenient location upon the erected wall. They may be installed during erection of the wall or they may be installed shortly after a given course of bricks have been layed by simply pushing the anchor stud **28** between the bricks and attaching the face plates **30.**

The wall anchor structure, when installed, provides a rigid and secure supportive base for attachment of the bracing device. When the wall no longer requires the support brace, the anchor can be easily and completely removed by detaching the brace structure from the wall anchor, slipping off the anchor face plates **30,** knocking out the anchor stud **28,** and grouting the remaining hole with mortar.

Foundation support for the brace is provided by the foot plate **23,** as shown in FIGS. **1, 2, 6** and **7.** To prevent the foot plate **23** from slipping on the supporting earth or flooring, supportive effect may be provided by the illustrated deadfall pins **35,** or other known ground-engaging protuberances may be formed on the plate bottom. Eyes **36** are provided on upstanding lugs **37** to connect the foot plates **23** with the brace buttress **22.**

It is a feature of the invention that support is provided to the wall by the brace **22** at a number of points. To accomplish this, stiff arms **25** are included for attachment to corresponding wall anchors **24** at intermediate points of the buttress brace **26.** These stiff arms **25** comprise, as illustrated in FIG. **2,** telescoping extensions **40** and **41** which can be mutually adjusted for interconnection between the anchors **24** and the buttress **22.** After adjustment, stiff arm rigidity is provided by a pin-and-eye structure **42.** For storage or transportation, the stiff arm extensions **40** and **41** may be telescopically collapsed, thereby providing a compact and easily handled bundle of parts.

Toppling forces which may be applied to the wall **20** are transmitted to the foot plate **23** through the buttress brace means **22.** To this end, the buttress brace **20** is connected to a wall anchor **24** at its upper end, to the stiff arms **25** at intermediate points, and to the ground plate **23** at its lower end.

In accordance with a feature of the invention, adjustment of the length of the buttress brace means **22** can be made by an automatic adjustment means **45.** In the illustrated embodiment, the buttress brace **26** includes relatively extensible leg portions **46** and **47** which may be telescopically disposed in a manner similar to the stiff arms **25.** Attached or formed within the upper leg portion **46** is a rack **48** which in the illustrated embodiment includes a series of slots **49** disposed in columnar array. A ratchet member **50** having a series of slot-engaging teeth **51** is pivoted upon the lower portion **47** for engaging the rack **48** through a hole **52** formed in the wall of the leg **47.** In the illustrated embodiment, the rack member **50** is hinged upon the lower leg portion **47,** by means of a freely operating hinge member **53** disposed at the lower end of the ratchet member **50.** To increase ease of operation, a handle **54** may be provided upon the ratchet member **50,** if desired.

In accordance with the invention, should the foot plate **23** sink into unstable soil or slide away from the wall and brace, the lower leg portion **47** attached to the foot plate **23** will simply be telescopically drawn away from the upper leg portion **46** attached to the wall. In so extending, the lower leg portion **47** will draw the attached ratchet **50** over the mating rack **48,** thereby causing the rack teeth **51** to release and repeatedly reengage the rack slots **49** in relatively more extended positions.

When wind or other forces are applied to the wall **20,** they are transmitted through the wall anchors **24** and stiff arms **25** to the buttress braces **26,** thereby urging the brace legs **46** and **47** into telescopic compression. This compressive action is resisted by the rack and ratchet adjustment means **45,** and are thus transferred to the supporting ground plate **23.**

An alternate form of construction of the automatic adjustment rack and ratchet mechanism **45** is shown in FIGS. **11** and **12.** In the embodiment illustrated there, the upper leg **46** may be provided with rack teeth **55** which may, if desired, be stamped or otherwise formed in the leg outer surface **56.** A ratchet member **58** having appropriately spaced teeth **59** is hinged by a pin **60** to the lower leg **47** of the buttress member **22,** as described above, and is positioned to engage the rack and ratchet mechanism through a hole **61** in the lower leg **47.**

Installation of the support brace may be easily accomplished by even inexperienced personnel. The wall anchors **24** may be installed during or immediately after construction of the wall, as described above. The foot plate **23** is then located upon the adjacent ground at a convenient distance from the wall **20** and in the same vertical plane as the wall anchors **24.** Thereafter, the buttress brace **26** is attached first to the uppermost wall anchors **24,** and to the foot plate **23.** When the lower leg portion **47** is telescopically extended from the upper leg portion **46,** the ratchet member **50** rides over the rack member **49,** thereby adjusting the buttress brace **26** for stiff support of the wall. Next, the stiff arm members **25** are installed between the corresponding wall anchors **24** and the buttress brace **22.** After the wall mortar has set, or other additional permanent support has been constructed as described above, the novel bracing can be removed, the wall anchor studs **28** withdrawn, and the remaining holes grouted.

Another alternate embodiment of the invention is shown in FIGS. **13–16,** inclusive, which is especially adapted to support pre-cast concrete panels **70** or the like in a vertical position above a horizontal ground or floor **71.**

Here, a buttress brace **73** which comprises a first strut tube **74** and a second strut tube **75** interconnected by a gross length adjusting mechanism **76.** The buttress brace **73** further includes a third strut tube member **77** which is interconnected to the second tube member **75** by a fine adjustment mechanism **78.** It is a feature of the invention that the length of the buttress brace **73** can be rapidly extended or contracted by use of the gross adjustment means **76,** which here includes a pin **80** adapted to engage aligned holes **81** and **82** formed in the first tube strut **74** and the second tube strut **75** respectively. To permit the pin **80** to be rapidly grasped and withdrawn from the struts **74** and **75** and subsequent gross adjustment of buttress brace length, through a finite number of length selections, the pin is adapted to protrude at least slightly from both struts.

Alternatively, the gross adjustment means can comprise the ratchet **50** and rack **48** described above to permit automatic extension of the buttress brace in response to appropriate foundation and wall relative

movement. To permit the ratchet member **50** to be grasped and withdrawn from contact with the rack in order to provide rapid extensive or contractive relative motion between the first and second struts, the ratchet member **50** is located at least partly outside both the first and second strut members **74** and **75.**

In orienting walls or panels **70** in a precisely vertical position, it is often desirable to extend or contract the length of the buttress **73** by relatively minute amounts over an infinitely variable range of positions. To that end, the present invention also includes a fine length adjustment means, which here comprises a bi-ended turnbuckle member **85** provided with opposite-handed threads at each end **86** and **87.** These threads are adapted to mate with opposite-handed threads formed on the second and third buttress strut tubes **75** and **77.** By appropriate rotation of the turnbuckle member **85,** the axially aligned struts **75** and **77** can be axially drawn toward or forced apart from each other. To assist in rotating the turnbuckle collar member **85,** a hole **89** can be formed in the member **85.** This hole **89** accommodates a lever (not shown) which can be forced through the turnbuckle and used in turning the member.

At each extremity of the brace **73,** anchors **90** are provided to attach the buttress brace to surrounding structure quickly and at low cost. As shown particularly in FIG. **16,** this anchor member **90** includes a face plate member **91** and upstanding ears **92** and **93** which accommodate a pin **94** interconnecting the member **90** and the buttress brace **73.** A bolt **95** or other convenient device extends into or through the wall **70** or the floor **71** to securely interconnect the bracing.

It is yet another feature of the invention that any stiff arm members **100** used with the brace can be quickly and easily attached at low cost. To this end, a slip collar **101** shown in FIG. **15** is provided. This slip collar **101** includes a rigid collar member **102** which is provided with an internal surface congruent with the right cross-sectional silhouette shape of the buttress brace **73** at the point at which the collar **102** is attached to the buttress brace **73.** Protruding from the collar **102** is a pin **104** or bolt which journals the collar **102** to the stiff arm **100** through convenient mounting holes **105.**

The following is claimed as invention:

1. An adjustable support brace for walls and the like, comprising foot anchor means for providing a foundation for the brace on an underlying surface, wall anchor means for attaching the brace to the supported wall including an anchor member adapted to extend through the wall and at least one face plate member for attachment to the anchor member in a position closely adjacent the wall face, thereby securing the anchor member in its position, the support brace further comprising stiff arm means attachable to the wall anchor means, stiff arm adjustment means for adjusting the length of the stiff arm means, first, second and third axially aligned struts comprising buttress brace means attachable to the stiff arm means, to the wall anchor means, and to the foot plate means, said first and second struts being telescopically interconnected, and buttress brace adjustment means for adjusting the length of the buttress brace means to place the buttress brace means in wall-supporting compression when the buttress brace means is attached to the stiff arm means, to the wall anchor means, and to the foot plate means, the buttress brace adjustment means including gross adjustment means rigidly positioning the first and second telescopically interconnected struts in any one of a finite plurality of axially spaced apart positions, and fine adjustment means positioning the second and third struts in any one of an infinite plurality of axially ranged positions.

2. An adjustable wall support brace according to claim **1** wherein said gross buttress brace adjustment means includes pin means adapted to engage aligned holes formed in said first and second struts to rigidly interposition them, the pin means protruding from both struts to permit the pin to be manually grasped and withdrawn from the struts.

3. An adjustable wall support brace according to claim **1** wherein at least a portion of said second strut is telescopically received inside a portion of said first strut, and wherein said gross buttress brace adjustment means includes extension means for automatically extending the length of the buttress brace means in response to relative movement of the wall anchor means and the foot plate means, and alternatively manually extending and retracting the length of the buttress brace means when desired, said extension means including a ratchet member fixed to the first strut and a rack-engaging ratchet member fixed to the second strut leg, the first strut ratchet member being positioned to release and reengage the second strut rack member in successive relatively more extended positions when tensioning extending forces are applied to the first and second struts of the buttress brace, and the first strut ratchet member being located at least partly outside both said first and second strut members to permit the ratchet member to be grasped and withdrawn from engagement with the rack member when gross adjustment of the relative positions of the first and second strut members is desired.

4. An adjustable wall support brace according to claim **1** wherein said fine buttress brace adjustment means includes a bi-ended turnbuckle member provided with opposite-handed threads at each end, and wherein said second and third strut members are provided with opposite-handed mating threads, the turnbuckle member, when threaded upon the struts, permitting the struts to be axially drawn toward each other or axially forces apart by appropriate rotation of the turnbuckle member relative to the second and third struts.

5. An adjustable wall support brace means according to claim **1** wherein said anchor means includes a slotted anchor member, and two wall face plates slotted for mutual engagement with the anchor member slots in positions closely adjacent the wall faces.

6. An adjustable support brace according to claim **1** including slip collar means connecting said stiff arm means and said buttress brace means, said slip collar means including a rigid collar member having arm internal surface congruent with the right cross-section silhouette shape of the buttress brace means at the point at which the collar member is attached to the buttress brace means, and pin means journalling the stiff arm means on the buttress brace means.

* * * * *