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Description

This invention relates to dismountable frameworks according to the preamble of claim 1 which may be used for a wide range of purposes in forming temporary semi-permanent and/or readily dismountable structures, particularly but not exclusively scaffolding, access towers or platforms, temporary load supports e.g. for locating concrete shuttering or other falsework used in building, constructing temporary buildings or shelters, collapsible freight containers and stillages, and the like.

In the past round section steel scaffold tubing has been almost universally employed for such purposes as the above, particularly by commercial contactors and, though in many respects this material has proved satisfactory, is does have practical disadvantages. The tubing is costly; it is heavy unwielding and difficult to store, transport and handle particularly for small scale applications e.g. domestic use, and in large scale applications such as substantial scaffolding erections, it is not always safe and sercure as joining is normally effected by clamps in frictional engagement with the tubing periphery. Insufficient tightening or failure of even a single clamp, which may be under considerable loading, can cause a chain reaction leading to collapse of the entire structure, particularly as the tubing is not normally joined in end to end relationship i.e. each joint forms a side by side connection with forces transmitted in shear through the clamp and bending and/or twisting moments being carried by the tubing.

FR—A—888 210 describes a set of members for constructing a dismountable framework comprising a plurality of operatively vertical elongate tubular pillar members and a plurality of elongate linking members also formed from tubular material. Some of the linking members are provided with end formations having upwardly and downwardly directed tenon formations which fit into socket formations constituted by the ends of the tubular pillar members for alignment of the latter in rectilinear end to end relationship, while others of the linking members have end portions formed as apertured lugs for engagement with appropriate tenon formations between the pillar members so that the linking members extend between the sets of pillars so formed.

The object of the present invention is to provide a dismountable framework which is easily and safely assembled and positively secured together without special skills, which is cheap and adaptable, which is particularly strong and rigid yet light in weight and economical of material, which can be provided in a range sizes including those suitable for domestic or "Do it Yourself" users, and which can be transported and stored in minimum of space.

The invention provides a set of members for constructing a dismountable framework characterised in that the member are L-section angle members; pillar angle members having a tenon formation secured in an inner corner and projecting beyond the end of said angle member and having at a second end a socket formation coaxial with said tenon formation and into which fits the tenon formation at the first end of an adjacent pillar angle member; and linking angle members having at each end a longitudinally projecting lug having an aperture for engagement on a tenon formation of the pillars; and further characterised by a retaining member on each pillar member which acts laterally upon said tenon formation to serure it against withdrawal from the socket formation and thus sercure together said two connected adjacent angle pillar members.

An embodiment of the invention with certain variations and modifications is now more particularly described with reference to the accompanying drawings, wherein:

Figure 1 is an exploded prespective view of part of a rectilinear framework;

Figure 2 is an elevation of an assembled joint of the framework;

Figure 3 is a sectional plan view on line 3-3 of Figure 2;

Figure 4 is a perspective view of a modified form of wedge;

Figure 5 is a perspective view of an end portion of a further form of cross member;

Figure 6 is a perspective diagram of an access tower;

Figures 7, 8 and 9 are perspective diagrams of examples of other structures utilising the invention; and

Figures 10, 11, 12 and 13 are perspective views of respective additional members for use with the invention.

A set of members for constructing a light duty rectilinear framework for use as scaffolding or the like, will first be described. The dismountable members in the example shown in figures 1 to 3, are of two kinds; vertical or pillar members 10 and linking members in the form of horizontal or cross members 11, major elongate parts of all of which consist of standard L section steel angle and having means for interconnection at each end thereof. For light duty applications such as a small domestic access platform, e.g. for use on a staircase or for constructing a work bench or the like each member can be an effective length of 75cm for ease of handling and storage and the angle section could be 2.5cm. Wider and heavier section may be used e.g. 40mm angle section in 3mm gauge metal for heavy duty frameworks and longer members may be employed in some circumstances.

In Figures 1 to 3 only the lower end of an upper pillar member 10*a* and the upper end of a lower such member 10*b* is shown together with one end only of three cross members 11*a, b, c* to connect with the pillar members at right angles.

Each pillar member 10 has a first operatively upper end portion forming a male connection by having a longitudinally extending tenon 12 welded to a block or distance piece between the inner faces of the angle webs and projecting

centrally through a square end abutment plate 13 which is also welded to said webs. In this example tenon 12 is a circular section steel peg having a flat or notch 14 on one side partway along its free length.

The second operatively lower end portion of each pillar member 10 forms a female connection including a mortice aperture 15, in this example a circular bore in the centre of a square end abutment plate 16 welded to the webs of the angle section.

The latter end portion is also provided with securing means comprising a stirrup member in the form of a U bolt 17 located in a pair of bores in one web of the angle so as to provide a loop within the angle which embracs tenon 12 when the latter is inserted into mortice 15. The outer ends of U bolt 17 mount a cross piece 18 permitting its effective length to be selectively adjusted and a captive wedge 19 acts betwen the outer face of the associate angle web and cross piece 18 to draw the U bolt 17 into tight position engagement with the notch 14 of tenon 12 to secure the assembly.

In the above manner a pillar of any desired length can be built up using successive pillar members 10 and these are secured in aligned end-to-end relationship so that down thrust is transmitted directly along their length. It will be observed that the inherent weight-bearing ability of a pillar so formed does not in any way depend on the security or clamping engagement of the securing means with the tenons 12.

Each cross piece 11 is formed from angle generally as described with reference to members 10 and both end portions of each cross member comprise a welded on end abutment plate 20 and an apertured lug 21 projecting longitudinally beyond plate 20, this lug being welded to the upper horizontal web of the angle either below *(21c)* or above (21*a, b*) the latter.

Where cross members are to be joined to the assembled pillar their lugs 21 are positioned on tenon 12 in sequence e.g. as illustrated in Figures 1 to 3 where a three-way connection is shown, before the tenon is engaged with the nest upper pillar member 10*a*.

The edge 19 is formed from flat plate and, as best shown in Figure 2, has one edge cut out to form a notch between upper and lower end stops 30*a*, 30*b* which retain the wedge captive with the U bolt 17. An upper part of the notch includes an inclined edge face 31 enabling the U bolt to be tightened by driving the wedge downwards to react with cross piece 18, elongated slots 18*a* in the latter permitting it to tilt on bolt 17. The lower part of the notch is deeper and not inclined to permit maximum inward movement of the U bolt for freeing the tenon 12. In a modification shown in Figure 4 the end stops 30*a*, 30*b* are bridge by a bar 32 integral with or welded onto said stops, so strenghtening the wedge and making its captive retention on cross piece 18 more positive.

Wedge 19 is perferably distictively coloured so that a very quick visual inspection of the assembled framework will show whether is has been tightened into place (or has become loosened or displaced in service). In any event the wedge will tend to drop to the secured position in use which will retain the tenon automatically even if the wedge has not been fully tightened and, as explained above, the integrity of the structure does not depend on this tightening, downward loading on the cross members 11 and/or upper pillar member 10*a* is transmitted directly to the top of pillar member 10*b* and lateral forces on the latter are transmitted from members 11 directly to the tenon 12, and securing means carries none of these forces.

Instead of the adjustable U bolts 17 a simple link or hook-shaped bar, or a screw clamp, could serve as a retaining member of the securing means, and it will also be appreciated that various forms of mortice and tenon could be employed though for ease of manufacture and availability of material, the round peg and circular apertures are preferred. Thus, oval, square or rectangular section mortices and tenons or other configurations might be employed in some applications and the section and shaping of the members themselves can be widely varied.

For some forms of framework a fourth horizontal cross member may be required to connect with the pillar assembly shown in Figures 1 to 3. Figure 5 shows an end portion of a fourth cross member 11*d* which can be connected at right angles to members 11*a*, 11*c* to form a continuation of member 11*b*. This member has an apertured lug 21*d* to engage tenon 12, and a slot 40 cut out of its upper web to provide clearance for the wedge 19. A pad 41 is welded to the virtical web of member 11*d* in the region of slot 40 for reinforcement.

The strength and stiffness of the framework can be added to by use of diagonal bracing to form a triangulated rectilinear structure and Figures 6 to 9 are perspective diagrams of our examples of the many forms of structure which can be provided using the invention.

Figure 6 shows a simple free-standing access platform or tower 49 using four pillar assemblies made up of sets of pillar members 10. The lowest portions of these assemblies are short pillar members 50 provided with adjustable levelling feet 51 shown in detail in Figure 12. Each side frame of the tower includes horizontal members 11 and is braced in the vertical plane by diagonal sloping linking members 52 extending from the tenon at the lower end of a lower pillar member to that at the upper end of the parallel pillar member on that side, members 52 having angled lugs at each end for this purpose. Additional rigidity is provided by horizontal diagonal linking members 53 connecting opposite corners of the frame, and the pillar members in this example are also provided with intermediate attachment points within the web angle to receive further horizontal cross braces 54 or, at the top level, horizontal members 55 forming a safety rail around a deck 56. Toe boards 57 are also shown. A pair of

horizontal locking members 58, show in detail in Figure 10 are used to finish off the tower these having socket formations 59 at each end at right angles to the length of the member with securing U bolts and wedges to engage the uppermost tenon formations of the pillar assemblies.

Figures 7, 8 and 9 are diagrams of three of many and varied forms of framework structures which may readily be assembled using the invention.

Figure 7 shows the bridging of a substantial span between two spaced towers 60, 61 similar to those shown in Figure 6, the righthand tower 61 being extended upwards to a working platform 62, for example at first floor window level. To add to the support of the horizontal span of this structure a further form of member is used, a diagonal cantilever member 63 (see Figure 11). This member has lug 64 angled to the horizontal at its lower end and a tenon formation 65 (as on the pillar members) angled to be vertical at its upper end to receive other members. To add to its rigidity the power end is also provided with a downwardly extending abutment 66 having a vertical face to locate against a face of the adjoining pillar member.

Also shown is a diagonal outrigger or buttress member 67 (see Figure 13) having angled lugs 68 at each end which extend horizontally in use to connect with respective tenon formations at different levels. Member 67 has an upwardly entending abutment 69 at its upper end with a vertical face to locate against a face of the adjoining pillar member.

In Figure 8 a free standing tower framework 65 is shown with a work platform 66 at second storey level cantilevered outward from opposite sides of the main tower using cantilever members 63, stability and support being provided by ground engaging feet 51 mounted on outriggers below the cantilevered parts of platform 66, the outriggers using buttress members 67 secured by locking members 58.

Figure 9 shows another form of framework 70 providing a longer work platform 71 at high level using cantilever members 63, one end of the platform being supported on the roof of a single storey building 72.

The different types of member may each be distinctively coloured by facilitate assembly and diagrams of common types of assembly listing the members required to build it may be provided. It is contemplated that such diagrams and listing may be provided for standard or for special purpose structures using a computer which will also be programmed to provide calculations of sale working loading, and, if required, costing of the members needed either on purchase or hire basis.

Using such a diagram the structures can be safely and reliably assembled even by unskilled or inexperienced labour, e.g. for "do it yourself" repairs or maintenance by householders themselves. As the structure is self-supporting and positively locating from the ground up it can be safely stood on and climbed up as erection proceeds.

The use of members to make up each side of a rectilinear triangulated framework or truss whose loads are transmitted in a common vertical plane along their axes, and the manner in which the loads are all carried to the axially centred tenons without reliance on the integrity of securing or fastening means or application of off-centre loadings there to as is the case when tubular or other members are secured side by side enables stable free standing structures to be provided avoiding the need in many case to "tie" them in to a building, and the ability to construct simple and safely cantilevered or bridging structures over a wide span means that access to many locations otherwise awkward to get to can be readily provided, and that room can be left at ground level for work and for unobstructed and safe passage e.g. along pavements or footways or to the doors or shop windows of a building being worked on.

Different weights or gauges of member may be employed in the same structure, for example a heavier gauge pillar member could be used in the lower parts of a tall tower or scaffolding or for the formation of a hollow girder or cantilever platform to span a substantial distance. Additional members can be purchased and added onto an existing system as required and it is anticipated that there will be considerable cost saving over conventional tubular scaffolding and clamps, for example steel angle equivalent in service to standard scaffold tubing costs, by weight, less than half the price of the latter and is in any event much lighter in weight for a given length. 40mm angle of 3mm gauge steel weighs 1.81Kg per metre length while the same length of standard steel scaffold tube weights 3Kg and will not withstand the same loading.

Other members and accessories including special purpose fittings can be incorporated in the set of members or adapted to interconnet therewith, for example access ladders or steps, telescopic legs or pillars, ground engaging wheels for moveable towers, staging or stillages, hoists or lifts for materials, doors or shutters for collapsible transport or storage racks or container frames, conveyor tracks etc.

Distal portions of the tenons 12 may each be provided with a through cross-bore to receive a securing bolt or lock e.g to prevent unauthorised dismantling or tampering with an assembled structure.

Claims

1. A set of members for constructing a dismountable framework to support a working platform at a substantial height above ground level comprising a plurality of elongate pillar members (10) and a plurality of elongate linking members (11) end portions of said members including interengageble tenon and socket formations (12,

15) for operative interconnection of the members for form the framework by aligning pillar members in rectilinear load bearing relationship to form vertical pillars with linking members extending between said pillars by having end portions engaged with the aligned members at the tenon and socket interconnections betwen adjacent aligned pillar members, characteraised in that the members are L-section angle members; the pillar angle members (10) have a said tenon formation (12) secured in an inner corner and projecting beyond the end of the said angle member and have at a second end a said socket formation (15) co-axial with said tenon formation and into which fits the tenon formation at the first end of an adjacent pillar angle member; each said linking member (11) has at each end a longitudinally projecting lug (21) having an aperture for engagement on a connecting tenon formation of the pillars; and further characterised by a retaining member (17) on each pillar member which acts laterally upon said tenon formation to secure it against withdrawal from said socket formation and thus secure together said two connected adjacent angle pillar members (10a, 10b).

2. A set of members as in Claim 1 characterised in that the retaining member (17) is a stirrup member which is tightened into locking engagement with the tenon formation by tightening means (18, 19).

3. A set of members as in Claim 2 characterised in that said tightening means includes a wedge (19).

4. A set of members as in Claim 3 characterised in that the stirrup member is a U bolt (17) having a cross-piece (18) mounted on its outer ends permitting its effective length to be adjusted, said wedge acting between said cross-piece and the associated angle pillar member (10a).

5. A set of members as in any preceding claim characterised in that the tenon formation has a notch or cut-away (14) with which the retaining member engages in use.

6. A set of members as in any preceeding claim characterised in that said first end portion is the operatively upper end of the one angle pillar member (10b).

7. A set of members as in any preceding claim characteriesed in that it includes at least two cross linking members (11*a, b, c*) whose apertured lugs (21*a, b, c*) are engageable with a common tenon formation (12).

8. A set of members as in any preceding claim characterised in that the linking members include at least one cross member (11) which is horizontal in use having apertured lugs (21) at each end for engagement with tenon formations (12) of respective spaced parallel pillar members (10) to provide a rectilinear framework.

9. A set of members as in any preceding claim characterised in that the linking members include at least one diagonal member (52) which is sloping in use having an apertured lug disposed at an angle at the operatively upper end for engagement with the tenon formation (12) at the upper end of one of a pair of parallel spaced pillar members (10) in use and an apertured lug disposed at an angle at the operatively lower end for engagement with the tenon formation at the lower end of the other of said pair in use to provide a triangulated rectilinear framework.

10 A set of members as in any preceding claim characterised in that the linking members include at least one diagonal member (53) which is horizontal in use for extending diagonally of a rectilinear framework comprising at least four horizontally spaced interconnected pillar members (10), the latter diagonal member having an apertured lug at each end to engage respective tenon formations (12) of the pillar members at the opposite corners.

11. A set of members as in any preceding claim characterised in that it includes at least one cantilever member (63) having an angled apertured lug (64) at its operatively lower end and a tenon formation (65) at its operatively upper end angled to be vertical in use on which other members can be located above and horizontally spaced from said lower end.

12. A set of members as in any preceding claim characterised in that it includes at least one buttress member (67) having apertured lugs (68) at operatively lower and upper ends angled to be horizontal in use whereby the lower end is operatively below and offset horizontally from a member with which the upper end is engaged in use.

13. A set of members as in Claim 10 or 11 characterised in that said cantilever member and said buttress member each include an abutment (66, 69) providing an operatively vertical face to locate against a face of an adjoining pillar member (10).

Patentansprüche

1. Bauteilsatz zur Herstellung eines zerlegbaren Gerüstes zur Aufnahme einer Arbeitsbühne in beträchtlicher Höhe über dem Erdboden, enthaltend eine Anzahl langer Stützteile (10) und eine Anzahl langer Verbindungsteile, wobie die Enden dieser Teile miteinander in Eingriff kommende Zapfen (12) und Buchsen (15) enthalten, so daß durch Zuaammenfügen dieser Teile ein Gerüst herstellbar ist, wobie die Stützteile vertikal ausgerichtet sind und die Verbindungsteile zwischen den Stützteilen angeordnet sind und ihre Enden über die Zapfen-Buchsen-Verbindungen mit den Stützteilen in Verbindung stehen, so daß sich eine geradlinige Lastaufnahme ergibt, dadurch gekennzeichnet, daß die Teile L-förmige Winkelteile sind, daß die windelförmigen Stützteile (10) in einer inneren Ecke den Zagfen (12) aufweisen, der Über das Ende des windelförmigen Stützteiles vorsteht, wobei an einem zweiten Ende eine koaxial mit dem Zapfen angeordnete Buchse (15) vorgesehen ist, in die der Zapfen des ersten Endes eines benachbarten winkelförmigen Stützeiles eingreift, daß ferner jedes Verbindungsteil (11) an jedem Ende einen in Lägnstrich-

tung vorspringenden Ansatz (21) aufweist, der eine öffnung besitzt, mit der ein Verbindungszapfen der Stützteile in Eingriff kommt, und daß ferner an jedem Stützteil ein Halterungselement (17) vorgesehen ist, das seitlich auf den Zapfen wirkt und ihn gegen ein Herausziehen aus der Buchse sichert, so daß die beiden miteinander verdundenen banachbarten Stützteile (10a, 10b) mietinander verriegelt sind.

2. Bauteilsatz nach Anspruch 1, dadurch gekennzeichnet, daß das Halterungselement (17) als Steigbügelteil ausgebildet ist, das mit dem Zapden durch Spannelemente (18, 19) fest verbunden ist.

3. Beauteilsatz nach Anspruch 2, dadurch gekennzeichnet, daß die Spannelemente einen Keil (19) umfassen.

4. Beauteilsatz nach Anspruch 3, dadruch gekennzeichnet, daß das Steigbügelteil einen U-förmigen Bolzen enthält, an dessen äußeren Enden ein Querstück befestigt its, das eine Justierung der wirksamen Länge gestattet, wobei der Teil zwischen dem Querstück und dem zugehörigen winkelförmigen Stützteil (10a) wirkt.

5. Bauteilsatz nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß der Zapfen eine Kerbe oder einen Asschnitt (14) aufweist, womit das Halterungselement in Eingriff kommt.

6. Bauteilsatz nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß das erste Ende durch das im Betrieb obere Ende des einen winkelförmigen Stützteiles (10b) begildet wird.

7. Bauteilsatz nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß er wenigstens zwei Quer-Verbindungsteile (11a, b, c) enthält, deren mit Öffungen versehenen Ansätze (21a, b, c) in Eingriff mit einem gemeinsamen Zapfen (12) kommen.

8. Bauteilsatz nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Verbindungsteile wenigstens einen Quer-Verbindungsteil (11) enthalten, der im Betrieb horizontal angeordnet ist und an beiden Enden mit Öffnungen versehene Ansätze (21) aufweist, die mit Zapfen (12) der mit Abstand zueinander parallel angeordneten Stützteile (10) in Eingriff kommen, so daß ein geradliniges Gerüst gebildet wird.

9. Bauteilsatz nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Verbindungsteile wenigstens einen Diagonalteil (52) enthalten, der im montierten Zustand geneigt aengeordnet ist und an sienem oberen Ende einen mit Öffnung versehenen Ansatz under einem Winkel aufweist, der mit dem Zapfen (12) am oberen Ende eines der beiden parallel zueinander angeordneten Stützteile (10) in Eingriff kommt, während am unteren Ende ein mit Öffnung versehener Ansatz unter einem Winkel vorgesehen ist und mit dem Zapfen am unteren Ende des anderen Stützteiles dieses Paares in Eingriff kommt, so daß sich ein dreieckförmiges geradliniges Gerüst ergibt.

10. Bauteilsatz nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Verbindungsteile wenigstens einen Diagonalteil (53) enthalten, der im montierten Zustand horizontal angeordnet ist und diagonal innerhalb eines geradlinigen Gerüstes verläuft, da wenigstens vier mit horizontalem Astand miteinander verbundene Stützteile (10) enthält, wobei dieser letztgenannte Diagonalteil einen mit Öffnung versehenen Ansatz an jedem Ende aufweist, der mit Zapfen (12) der Stützteile an den entgegengesetzten Ecken in Eingriff kommt.

11. Bauteilsatz nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß wenigstens ein Auslegerteil (63) vergesehen ist, der en seinem im Betrieb underen Ende einen mit Öffnung versehenen, winkligen Ansatz (64) und en seinem oberen Ende einen Zapfen (65) aufwiest, der so gewinkelt ist, daß er im Betrieb vertikal steht, wobei hierauf mit horizontalem Abstand vom unteren Ende andere Bauteile angeordnet werden können.

12. Bauteilsatz nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß wenigstens ein strebepfeilerteil (67) vorgesehen ist, der an seinem oberen und unterem Ende mit Öffnungen versehene Ansätze (68) aufweist, die so gewinkelt sind, daß sie im Betrieb horizontal liegen, wobei das untere Ende unterhalb und seitlich versetzt gegenüber einem Teil liegt, mit dem das obere Ende in Eingriff steht.

13. Bauteilsatz nach Anspruch 10 oder 11, dadurch gekennzeichnet, daß der Auslegerteil und der Strebepfeilerteil jeweils ein Widerlager (66, 69) enthalten, das eine vertikale Stirnfläche bildet, die gegen eine Stirnseite eines angrenzenden Stützteils zur Anlage kommt.

Revendications

1. Ensemble d'élémentes pour la construction d'une charpente démontable de support d'une plate-forme de travail à une hauteur notable au-dessus du sol comprenant une pluralité d'éléments allongés de piliers (10) et une pluralité d'éléments allongés de liaison (11), des parties terminales desdits éléments avec des tenons et embôitements (12, 15) qui s'accrochent mutuellement pour une liaison efficace des éléments afin deformer la charpente par alignement d'éléments de piliers en disposition rectiligne de support de la charge pour constituer des piliers verticaux avec des éléments de liaison s'étendant entre ces piliers avec des parties terminales engageant les éléments de piliers alignés au niveau des liaisons à tenons et emboitements entre des éléments de piliers adjacents alignés, caractérisé en ce que les éléments sont constitués par des cornières à section en L ; les cornières de piliers (10) comportent une dite partie formant tenon (12) fixée dans un angle intérieur et faisant saillie au-delà de l'extrémité de ladite cornière et, à une seconde extrémité, und dite partie formant emboîtement (15) coaxiale à la partie en forme de tenon et à l'intérieur de laquelle s-engage la partie en forme de tenon de la première extrémité d'une cornière

de pilier adjacente; chaque élément de liaison (11) comporte à chaque extrémité une oreille (21) faisant saillie longitudinalement et dotée d'une ouverture pour l'engagement d'une partie de liaison en forme de tenon des piliers ; et caractérisé de plus par un élément de reteune (17) sur chaque élément de pilier qui agit latéralement sur ladite partie en forme de tenon (12) pour empêcher son retrait de ladite partie formant emboîtement et ainsi solidariser ensemble les deux éléments de piliers en cornières adjacents reliés l'un à l'autre (10a, 10b).

2. Ensemble d'éléments selon la revendication 1, caractérisé en ce que l'élément de retenue (17) est un élément en forme d'étrier qui est bloqué en position de verrouillage de la partie en forme de tenon par des moyens de blocage (18, 19).

3. Ensemble d'éléments selon la revendication 2, caractérisé en ce que lesdits moyens de blocage comrennent un coin (19).

4. Ensemble d'éléments selon la revendication 3, caractérisé en ce que l'élément en forme d'étrier est constitué par un boulon en U (17) sur les extrémités extérieures duquel est montée une entretoise (18) qui permet de régler la longueur effective du boulen, ledit coin agissant entre ladite entretoise et l'élément de pilier en cornière associé (10a).

5. Ensemble d'éléments selon l'une quelconque des revendications précédentes, caractérisé en ce que la partie en forme de tenon présente une encoche ou un éivdement (14) dans laquelle, en utilisation, l'élément de retenue vient s'engager.

6. Ensemble d'éléments selon l'une quelconque des revendications précédentes, caractérisé en ce que ladite première partie terminale est constituée par l'extrémité supérieure active de l'élément de pilier en cornière (10b).

7. Ensemble d'éléments selon l'une quelconque des revendications précédentes, caractérisé en ce qu'il comprend au moins deux éléments de liaison transversaux (11a, b, c) dont les oreilles évidées (21a, b, c) sont destinécs à être engagées par une partie commune formant tenon (12).

8. Ensemble d'éléments selon l'une quelconque des revendications précédentes, caractérisé en ce que les éléments de liaison comprennent au moins une traverse (11) qui est horizontale en position d'utilisation en ayant à chaque extrémité des oreilles évidées (21) qui sont destinées à être engagées par des parties formant tenons (12) d'éléments de piliers (10) respectifs parallèles et écartés pour constituer une charpente restiligne.

9. Ensemble d'éléments selon l'une quelconque des revendications précédentes, caractérisé en ce que les éléments de liaison comprennent au moins un élément diagonal (52) qui est incliné en position d'utilisation, en ayant à son extrémité supérieure active une oreille évidée disposée à un angle pour être engagée en utilisation par la partie en forme de tenon (12) de l'extrémité supéricure de l'un des éléments de piliers d'une paire d'éléments de piliers (10), et à son extrémité inférieure active une oreille évidée disposée à un angle pour être engagée utilisation par la partie en forme de tenon de l'extrémité inférieure de l'autre élément de pilier de ladite paire, pour constituer une charpente rectiligne triangulée.

10. Ensemble d'éléments selon l'une quelconque des revendications précédentes, caractérisé en ce que les éléments de liaison comprennent au moins un élément diagonal (53) qui est horizontal en position d'utilisation et qui s'étend selon un diagonale d'une charpente rectiligne qui comprend au moins quatre éléments de piliers (10) espacés horizontalement et reliés entre eux, ledit élément diagonal présentant à chaque extrémité une oreille évidée destinée à engager les parties en forme de tenons (12) respectives des élément de piliers aux angles opposés.

11. Ensemble d'éléments selon l'une quelconque des revendications précédentes, caractérisé en ce qu'il comprend au moins un élément en console (63) présentant à son extrémité inférieure active une oreille évidée (64) formant un angle et, à son extrémité supérieure active, une partie en forme de tenon (65) qui fait un angle façon à être verticale en utilisation et sur laquelle d'autres éléments peuvent être disposés au-dessus de ladite extrémité inférieure en étant écartés horizontalement de celle-ci.

12. Ensemble d'éléments selon l'une quelconque des revendications précédentes, caractérisé en ce qu'il comprend au moins un élément d'arc-boutement (67) présentant des oreilles évidées (68) à ses extrémités actives supérieure et inférieure, ces oreilles formant des angles pour être horizontales en position d'utilisation, de sorte que son extrémité inférieure se trouve au-dessous et déportée horizontalement par rapport à un élément qu l'extrémité supérieur engage en position d'utilisation.

13. Ensemble d'éléments selon la revendication 10 ou 11, caractérisé en ce que ledit élément en console et ledit élément d'arc-boutement comprennent chacun un aboutement (66, 69) constituant une face verticale active destinée à s'appliquer contre une face d'un élément de piliers contigu (10).

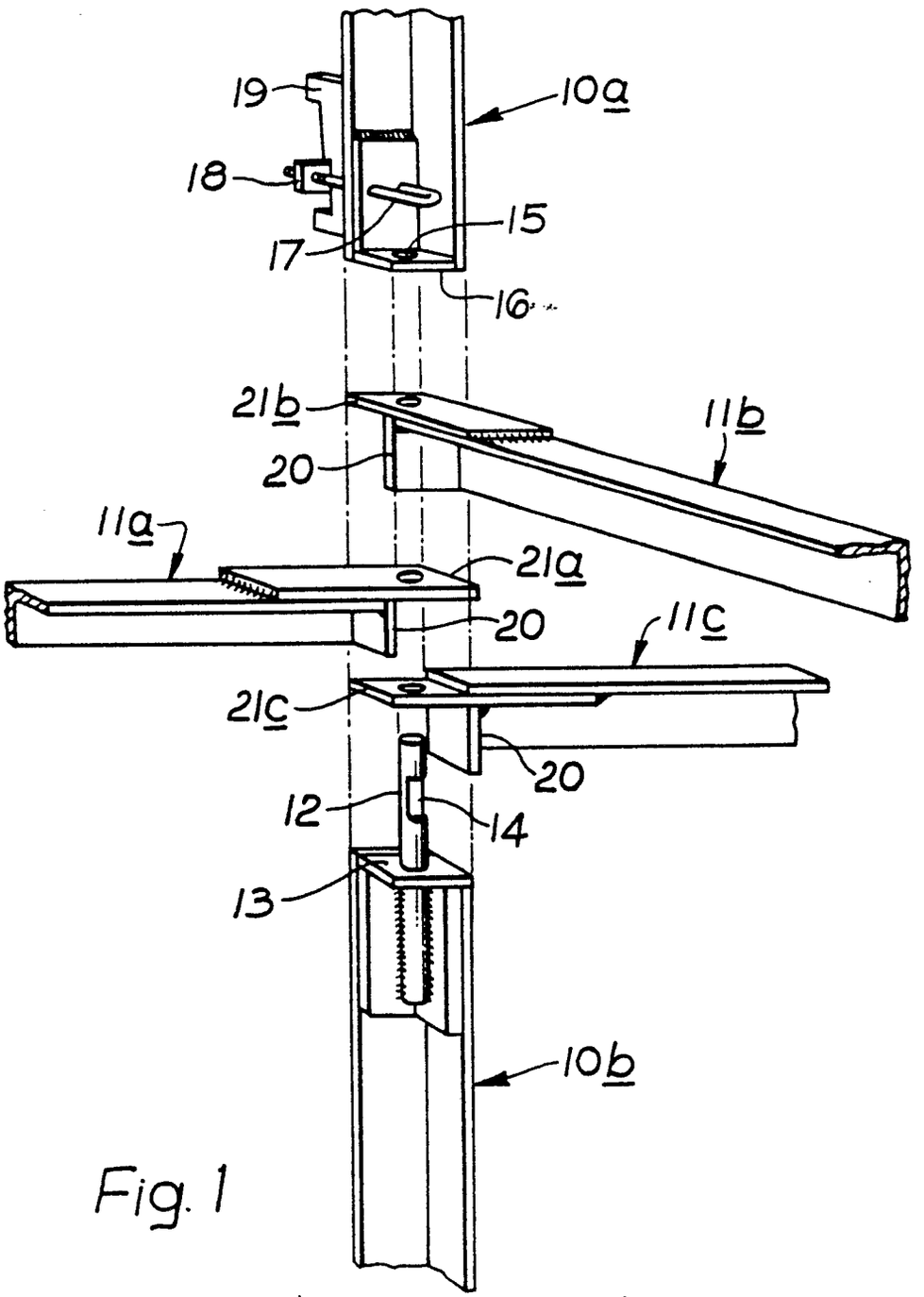


Fig. 1

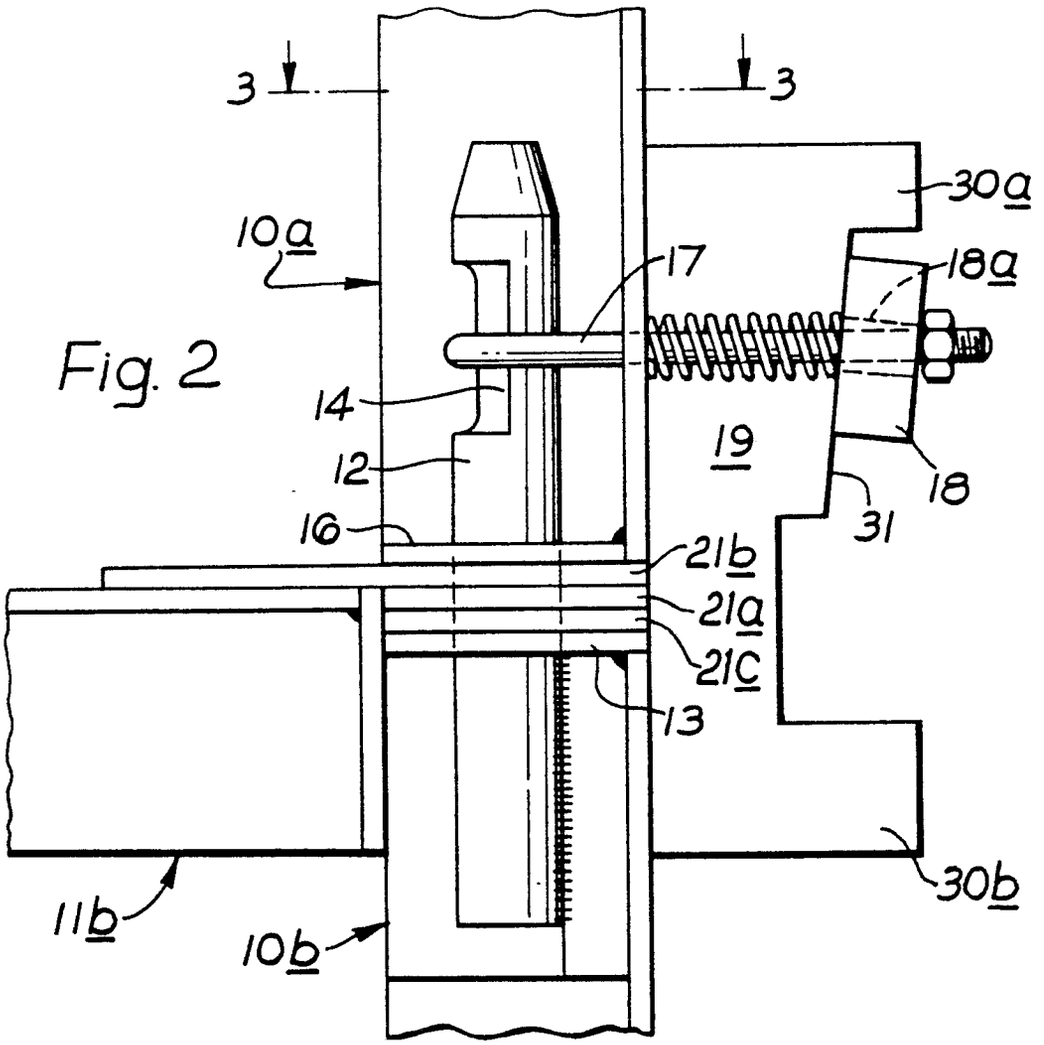

3
3
30a
10a
17
18a
14
19
12
18
16
31
21b
21a
21c
13
30b
11b
10b

Fig. 2

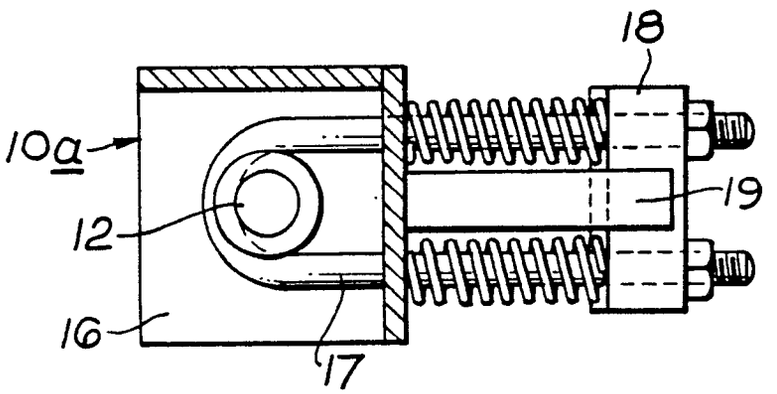

18
10a
19
12
16
17

Fig. 3

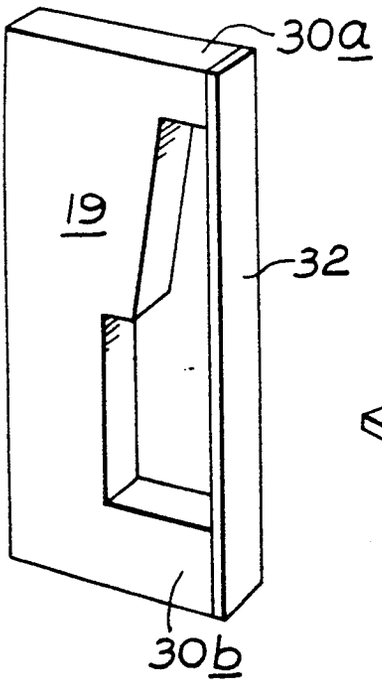


Fig. 4

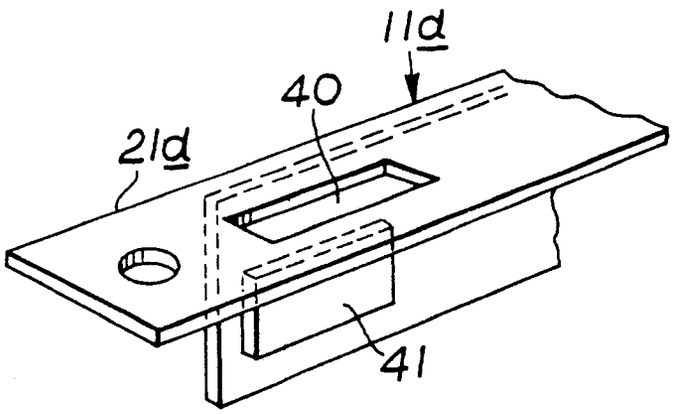


Fig. 5

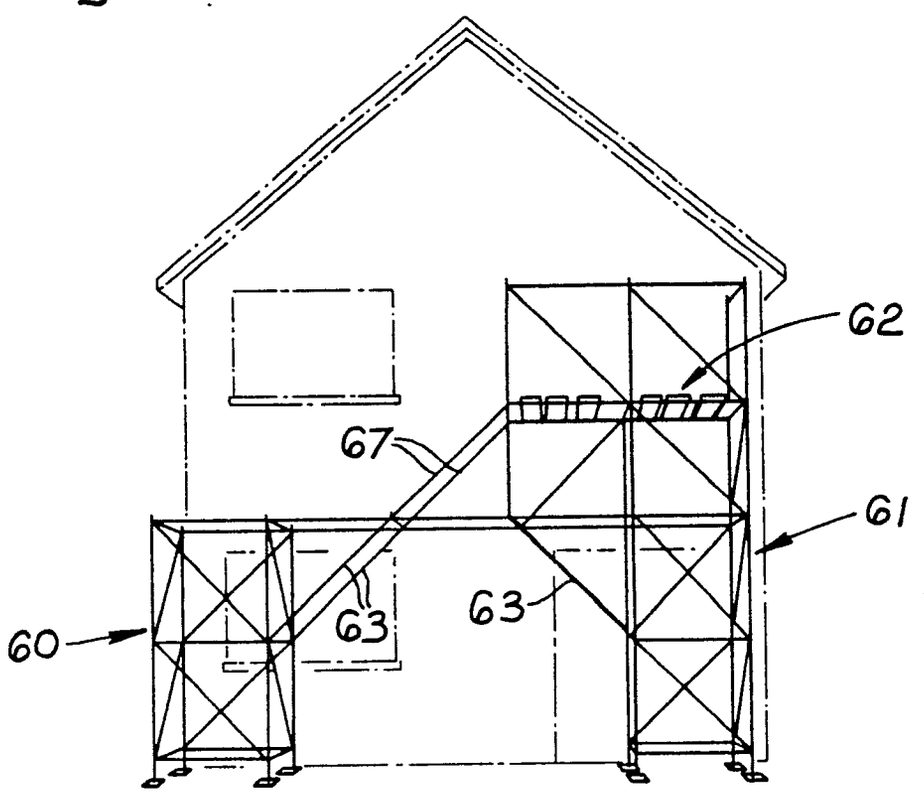


Fig. 7

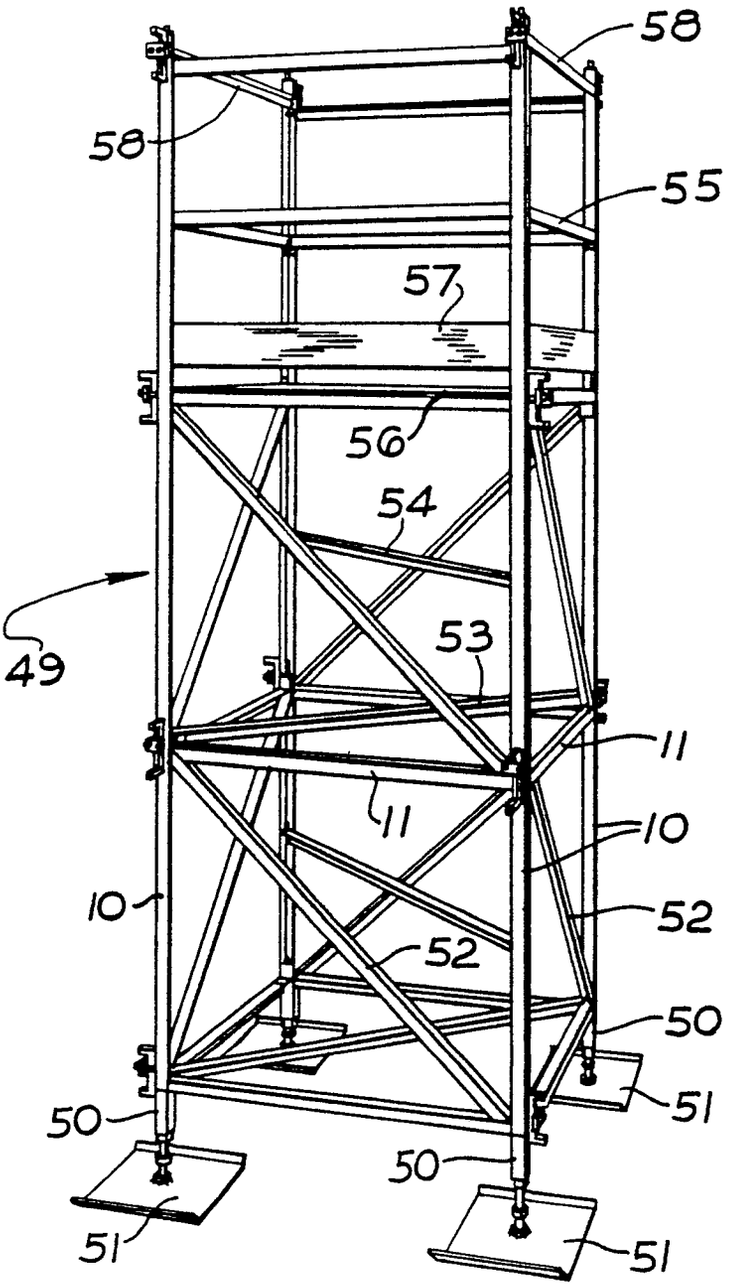


Fig. 6

Fig. 8

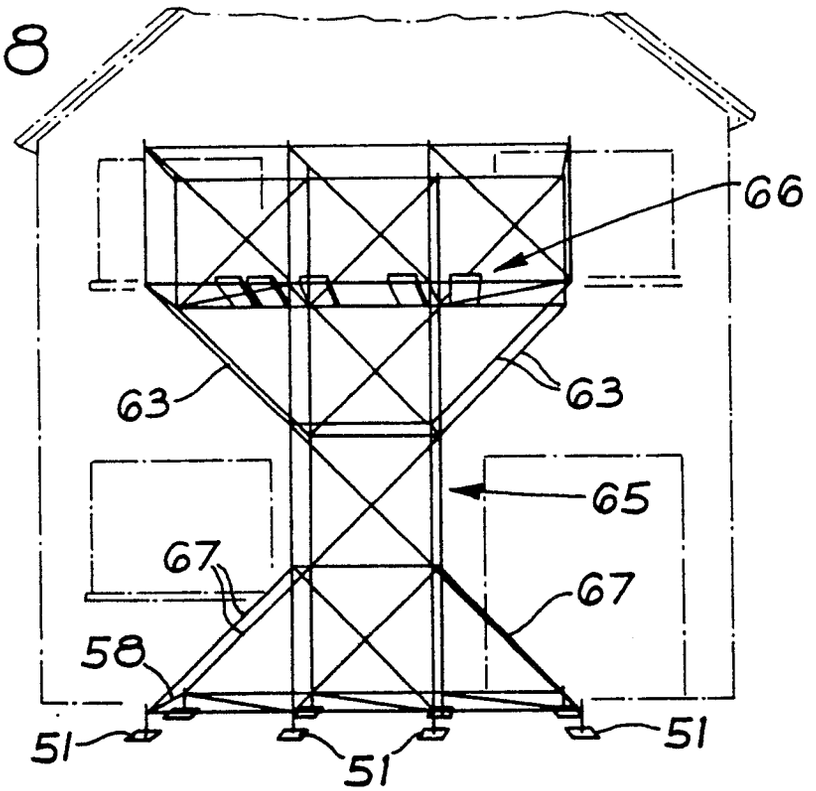
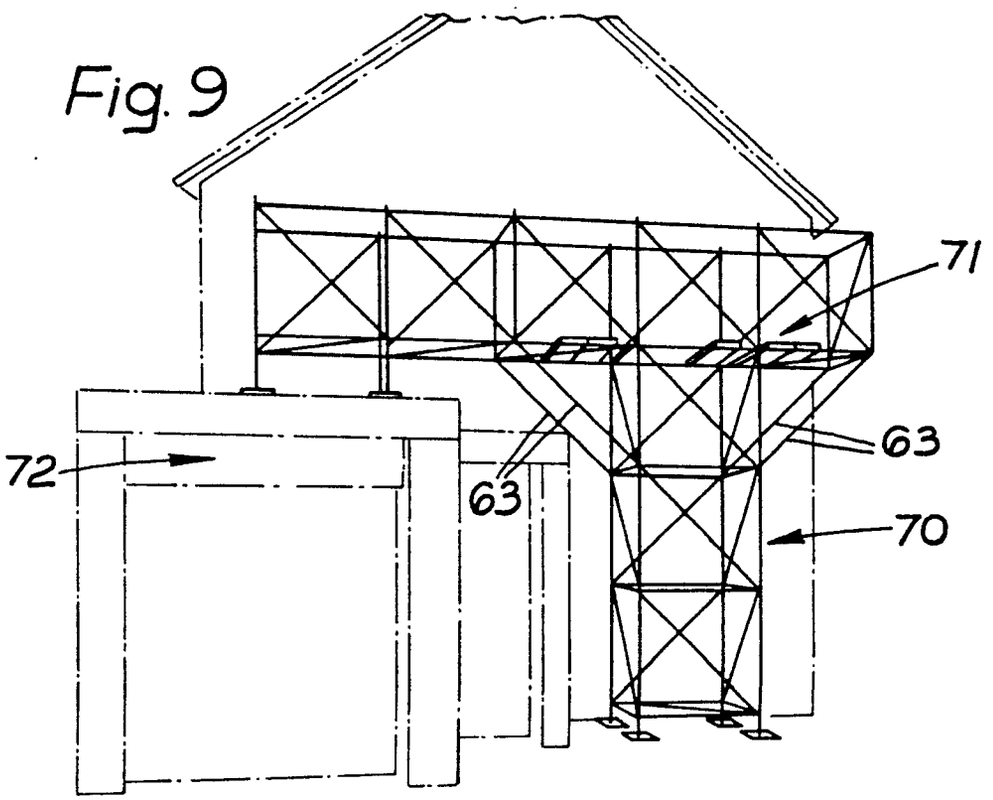


Fig. 9



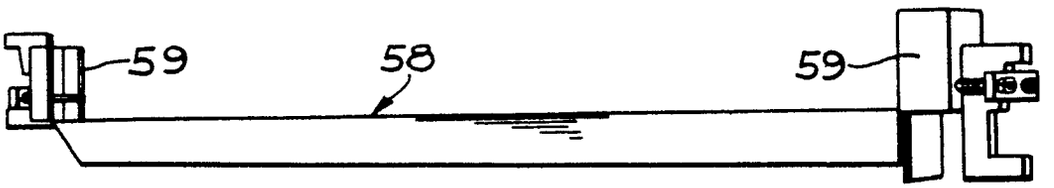


Fig. 10

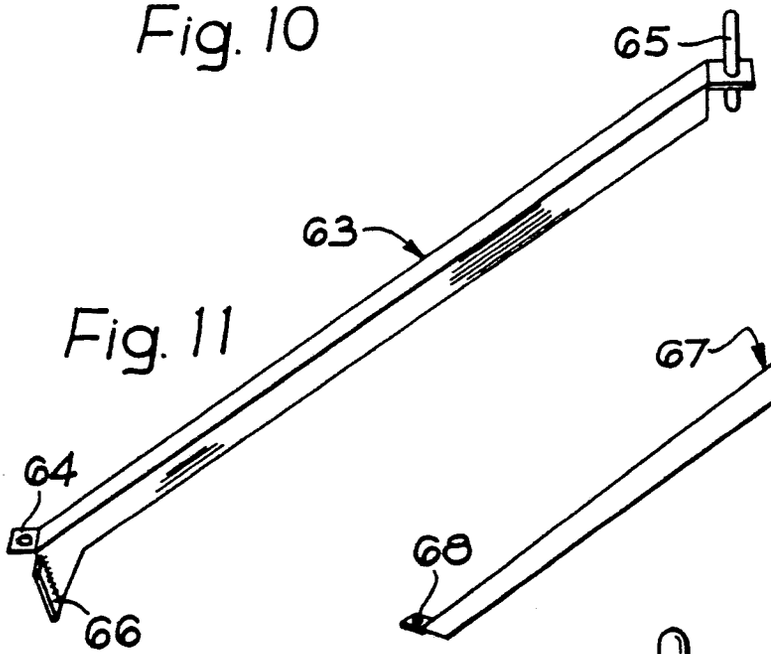


Fig. 11

Fig. 13

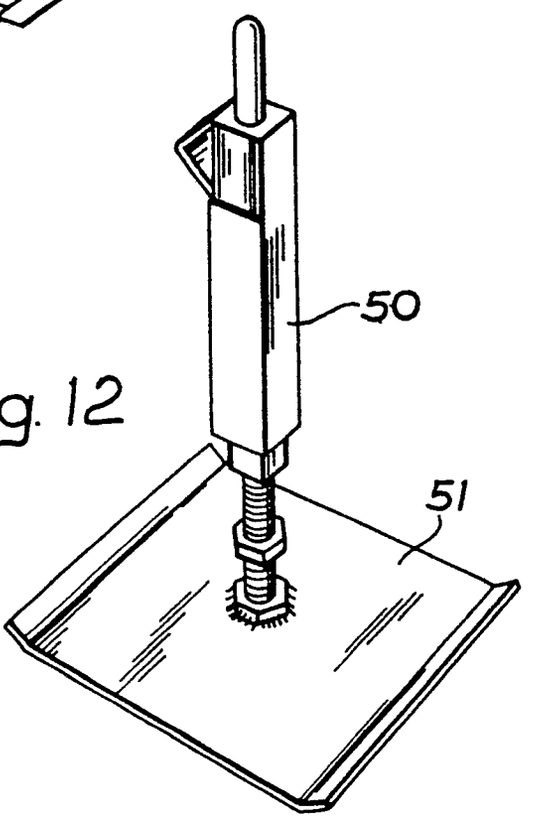


Fig. 12