



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
13.09.2017 Bulletin 2017/37

(51) Int Cl.:
E06B 1/60 (2006.01) E04F 21/00 (2006.01)

(21) Application number: **17152983.7**

(22) Date of filing: **25.01.2017**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(72) Inventors:
• **AUCIELLO, Phillip**
Stamford, PE29 2JG (GB)
• **BURROWES, Dale**
Leicester, LE1 5TT (GB)

(74) Representative: **Forsyth, Helen Jane et al**
Nash Matthews LLP
24 Hills Road
Cambridge CB2 1JP (GB)

(30) Priority: **11.03.2016 GB 201604187**

(71) Applicant: **Stamford Tools Limited**
Stamford, Lincolnshire PE9 2PQ (GB)

(54) **APPARATUS FOR ALIGNING A FRAME WITHIN A BUILDING APERTURE**

(57) There is provided apparatus (10) for aligning a frame within a building aperture, such as a door or a window, comprising two extendable arms (14, 16) connected to opposing ends of a first elongate member (12), wherein a rack and pinion mechanism (40) positioned within the first elongate member (12) is operable to extend the arms (14, 16) laterally relative to the first elongate member (12) and a free end of each arm is provided with a fixing point (26) configured to receive a second detachable elongate member (11). The detachable second elongate member (11) is a spirit level. The rack and pinion mechanism (40) is provided with a deformable region (50) so as to allow folding of the first elongate member (12).

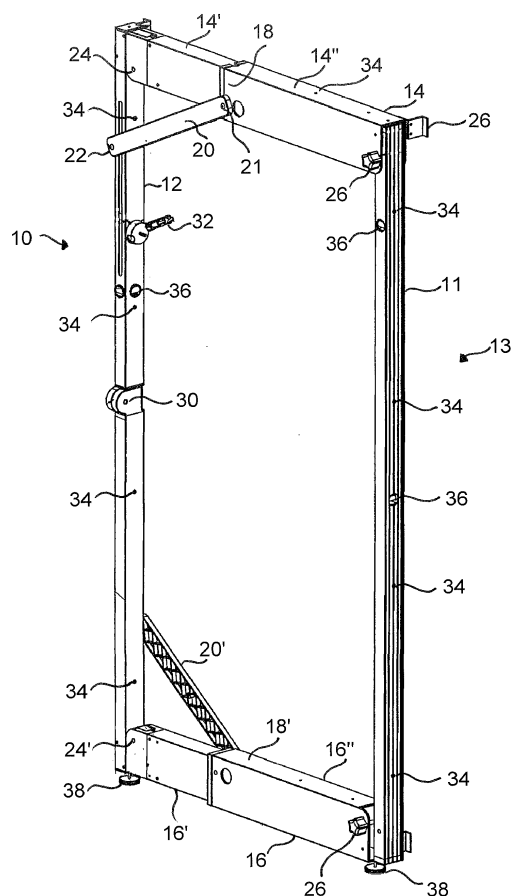


FIG. 1

Description

Field of the Invention

[0001] The invention relates to apparatus for aligning a frame within a building aperture and so defining the dimensions of an opening in which a door or window frame is to be positioned.

Background to the Invention

[0002] When constructing openings for doors within buildings, an initial rough aperture larger than the intended door, is formed within a wall. The door aperture is irregular and not a perfect rectangle due to variations in floor level, ceiling height and variations in measurement tolerance. A door lining jig is used within the aperture to create a rectangular lining or frame that exactly matches the dimensions of a selected door. This allows a frame to be constructed with internal dimensions that match the dimensions of the door. Any gaps between the frame and aperture are filled. Once the frame is in position, the door lining jig is removed and the door is attached to the frame, i.e. the door is hung.

[0003] As the door lining jig needs to extend over a considerable vertical extent, representing the height of the door, the door jig can twist and bow, making it hard to create an accurate aperture for the door. Further door jigs are often bulky pieces of equipment that are not readily portable.

Summary of the Invention

[0004] In accordance with the present invention, there is provided apparatus for aligning a frame within a building aperture, such as for a door or window, the apparatus comprising two extendable arms connected to opposing ends of a first elongate member, wherein a rack and pinion mechanism positioned within the first elongate member is operable to extend the arms laterally relative to the first elongate member and a free end of each arm is provided with a fixing point configured to receive a second detachable elongate member. The laterally extendable arms define the upper and lower horizontal extent of an aperture and the first and second elongate members define the vertical extent of the aperture. By having arms with a free end capable of receiving a second elongate member, a detachable second elongate member can be configured as a spirit level. This allows the apparatus or jig to be sold either on its own or as a frame aligning assembly in combination with the second elongate member being a detachable spirit level. The frame aligning assembly including a separate spirit level allows a building professional to use either the apparatus in combination with the spirit level to define an aperture or to use the spirit level on its own. Where the apparatus is intended for use as a door frame aligning assembly, the length of the spirit level is preferably comparable to the height

of a door frame.

[0005] Preferably the arms are extendable in unison, such that operation of the rack and pinion mechanism acts to move each arm by an equal amount at the same time.

[0006] The first elongate member may comprise at least two pivotally connected sections, allowing the sections to be folded against each other so as to reduce the vertical extent of the first elongate member for storage purposes. In such an arrangement, preferably the rack and pinion mechanism is provided with a deformable region, typically interconnecting links, so as to permit folding of the two or more sections.

[0007] The rack and pinion mechanism is preferably operable using an externally mounted rotation device, such as a manually operable handle or a mechanically operated rotator, such as a drill.

[0008] Where a manually operable handle is provided, the handle may be configured to allow optional mechanical operation of the rack and pinion mechanism, for example by using a drill.

[0009] Preferably the rack and pinion mechanism comprises two opposing toothed gear racks, such that operation of the rack and pinion mechanism results in equal and opposite movement of each gear rack and equal extension of each arm as a pinion located between the two racks is rotated.

[0010] The detachable second elongate member is preferably rigid and incorporates a level detector, and can be configured as a spirit level having a length of between 1.9 m to 2.1 m, similar to the height of a standard door.

[0011] Preferably each extendable arm is connected to the rack and pinion mechanism by a bracing member pivotally attached to both the rack and pinion mechanism and the extendable arm. The maximum lateral extent of the arm is defined by the brace as it is moved along the rack and pinion mechanism.

[0012] Each extendable arm may be telescopically extendable, comprising at least two nested sections, with an inner section pivotally attached to one end of the first elongate member and an outer section pivotally attached to the bracing member.

[0013] In accordance with another aspect of the invention there is provided a frame aligning assembly comprising apparatus as above and a detachable second elongate member which is preferably a spirit level.

[0014] The invention will now be described, by way of example, with reference to the accompanying drawings in which:

Figure 1 shows a perspective view of the frame aligning apparatus with a detachable spirit level in position;

Figure 2 shows a partially cut away view illustrating a rack and pinion mechanism used within the apparatus;

Figure 3 is a perspective partially cut away view il-

illustrating operation of the rack and pinion mechanism;

Figure 4 is a detailed view of the rack and pinion mechanism;

Figures 5 to 9 illustrate operation of the rack and pinion mechanism to place the apparatus in a folded condition; and

Figures 10(a) and (b) show respectively a perspective view and view from the top of a handle used in connection with the apparatus.

Description of the Invention

[0015] Figure 1 shows apparatus 10 in accordance with the invention for aligning a frame within a door or window aperture and which incorporates a detachable spirit level 11 to provide a frame aligning assembly used to fix the dimensions of a frame onto which a door is to be hung or a window to be inserted. In Figure 1, spirit level 11 is around 2m in length to provide a door aligning assembly 13.

[0016] Apparatus 10 comprises an elongate member 12 which in a fully extended position as shown represents the height of a door frame and laterally extendible upper and lower arms 14, 16 which comprise inner and outer nested sections 14', 14" and 16', 16". Outer portion 14", 16" of each telescopic arm 14, 16 is pivotally attached at an innermost end 18, 18' to one end of bracing member 20, 20' by pin 21, with the other end of bracing member 20, 20' pivotally attached by linkage pin 22 to rack and pinion mechanism 40 contained within elongate member 12 and which can be seen with regard to Figure 2. Each arm 14, 16 is pivotally attached to elongate member 12 by end pin 24, 24' so as to be capable of folding against elongate member 12 when in a retracted, non-extended position. The outer nested sections 14", 16" have a hollow rectangular cross section with a U-shaped profile at the outermost end to accommodate spirit level 11. A lock and clip arrangement 26 is located at the end of each arm 14, 16 furthest from elongate member 12 for securing detachable spirit level 12 into the apparatus. By having deep top and bottom extendable arms typically of depth 0.02m to 0.05m from an upper horizontal edge to a lower horizontal edge, the arms are able to resist torsion effects and provide a more stable jig.

[0017] Elongate member 12 is provided with central pivot point 30 to allow it to be folded into two overlying sections for compactness when not in use and handle 32 is attached to an outer face of elongate member 12, rotatable to operate rack and pinion mechanism 40. If desired, handle 32 can be detached and rack and pinion mechanism 40 operated using engagement of a rotatable drill chuck.

[0018] A plurality of fixing points 34 are provided within elongate members 11, 12 and upper arm 14 so as to allow assembly 13 to be secured into a door lining while a frame is constructed. This is to avoid vertical and horizontal distortion of the frame shape as the frame is con-

structed. As can be seen from Figure 1, level guides 36 such as bubble levels can be incorporated into arms 14, 16 and elongate member 12 if desired.

[0019] Adjustable feet 38 are provided on the end of elongate member 12 and the outermost end of outer telescoping section 16" to allow for level adjustment of the assembly.

[0020] Figure 2 shows a partially cut away view illustrating rack and pinion mechanism 40. Rack and pinion mechanism 40 comprises two opposing racks 42, 44 positioned either side of pinion 46, see Figure 4, an upper end of rack 44 pivotally attached to brace 20 and rack 42 connected to an elongate strip 48 pivotally attached to brace 20'. Rotation of handle 32 causes racks 44, 42 to move in equal and opposite directions, which depending on the direction of rotation, either extends or retracts arms 14, 16 by equal amounts laterally relative to elongate member 12.

[0021] A plurality of interconnected flexible links 50 are provided within elongate strip 48. When arms 14, 16 are fully retracted, links 50 overlie pivot point 30 formed midway along elongate member 12. This allows folding of elongate member 12 into two equal overlying sections for compactness.

[0022] Figures 5 to 9 illustrate how alignment apparatus 10 can be folded into a compact unit for storage and transport. Figures 5 through to 9 show how door jig 10 can be taken from an open state as used to assist with construction of a door frame to a compact folded unit. As will be readily appreciated, the figures can be followed in reverse to obtain an assembled door jig from the folded unit.

[0023] From an open state in Figure 5, which corresponds to Figure 3, handle 32 rotates pinion 46 to cause opposing movement of rack portions 42, 44 until racks 44 and 42 overlie. As rotation of handle 32 takes place, outer portions 14" and 16" of arms 14, 16 respectively retract towards elongate member 12 due to pivotal linkages 20, 20' connected between the outer nested sections of telescoping arms 14, 16 and rack and pinion mechanism 40. Figure 6 illustrates when arms 14, 16 are fully retracted but are positioned laterally to elongate member 12 at an angle of substantially 90°. Arms 14, 16 are then manually folded in towards elongate member 12 about pivot pins 24, 24', see Figure 7, and elongate member 12 is then folded on the vertical axis, see Figure 8, about pivot point 30, with folding facilitated by links 50. Door jig 10 is shown in the fully collapsed condition in Figure 9.

[0024] Handle 32 is shown in detail in Figures 10(a) and (b) and comprises a cylindrical base portion 60 from which a central hexagonal pin 62 extends to engage with a matching aperture in pinion 46. A pivotally mounted handle 64 is attached to the edge of base portion 60 and is pivotable over pin 62 to allow for ease of rotation of pin 62 by an electric drill chuck.

[0025] By having a jig assembly comprising a foldable jig and a rigid detachable spirit level, the jig assembly

can fulfil two roles, namely use as a jig for assembling a frame and separate use of the spirit level. Spirit levels are required more regularly than jig frames and therefore the assembly will be useable on more occasions with a detachable spirit level than where a permanently connected rectangular structure is provided for the jig. The jig apparatus can be folded to take up a small volume when not in use, still allowing use of the detachable spirit level.

[0026] During assembly of a frame, the jig assembly of the present invention sits inside an aperture designed to receive a door or window such that screws can be positioned through fixing points 34 directly into the building structure forming the aperture. This prevents twisting or distortion of the jig shape and ensures the frame remains square. The jig facilitates easy and accurate installation of a frame within a building opening, such as for a door or window.

[0027] The jig can be used to define a frame for double doors or apertures having multiple fittable doors, typically by using a pair of jigs at either edge of the aperture and connecting the jigs using elongate members, such as lengths of timber, secured to the fixing point of the free end of each arm 14, 16. The jig can also be used to define a frame for window apertures, providing a re-usable template around which bricks can be laid to define a window aperture.

Claims

1. Apparatus for aligning a frame within a building aperture comprising two extendable arms connected to opposing ends of a first elongate member, wherein a rack and pinion mechanism positioned within the first elongate member is operable to extend the arms laterally relative to the first elongate member and a free end of each arm is provided with a fixing point configured to receive and secure a second detachable elongate member.
2. Apparatus according to claim 1, wherein the detachable second elongate member is configured as a spirit level.
3. Apparatus according to claim 1 or claim 2, wherein the first elongate member comprises at least two pivotally connected sections.
4. Apparatus according to claim 3, wherein the rack and pinion mechanism is provided with a deformable region so as to allow folding of the two or more connected sections.
5. Apparatus according to any of the preceding claims, wherein the rack and pinion mechanism is operable using an externally mounted rotation device.
6. Apparatus according to claim 5, wherein a manually operable handle is provided.
7. Apparatus according to any of the preceding claims, wherein the rack and pinion mechanism comprises two opposing toothed gear racks, each gear rack acting on one of the extendable arms such that operation of the rack and pinion mechanism results in equal and opposite movement of each gear rack and equal extension of each arm.
8. Apparatus according to claim 7, wherein the rack and pinion mechanism is operable to move the arms in unison.
9. Apparatus according to any of the preceding claims, wherein the detachable second elongate member is rigid and incorporates a level detector.
10. Apparatus according to any of the preceding claims, wherein the detachable second elongate member has a length of between 1.9 m to 2.1 m.
11. Apparatus according to any of the preceding claims, wherein each extendable arm is connected to the rack and pinion mechanism by a bracing member, pivotally attached to both the rack and pinion mechanism and the extendable arm, with the maximum lateral extent of the arm being defined by the bracing member.
12. Apparatus according to any of the preceding claims, wherein each extendable arm is telescopically extendable, comprising at least two nested sections, with an inner section pivotally attached to one end of the elongate member and nested within an outer section pivotally attached to the bracing member.
13. A frame aligning assembly comprising apparatus according to any of the preceding claims and a detachable second elongate member.
14. A frame aligning assembly according to claim 13, wherein the detachable second elongate member is a spirit level.

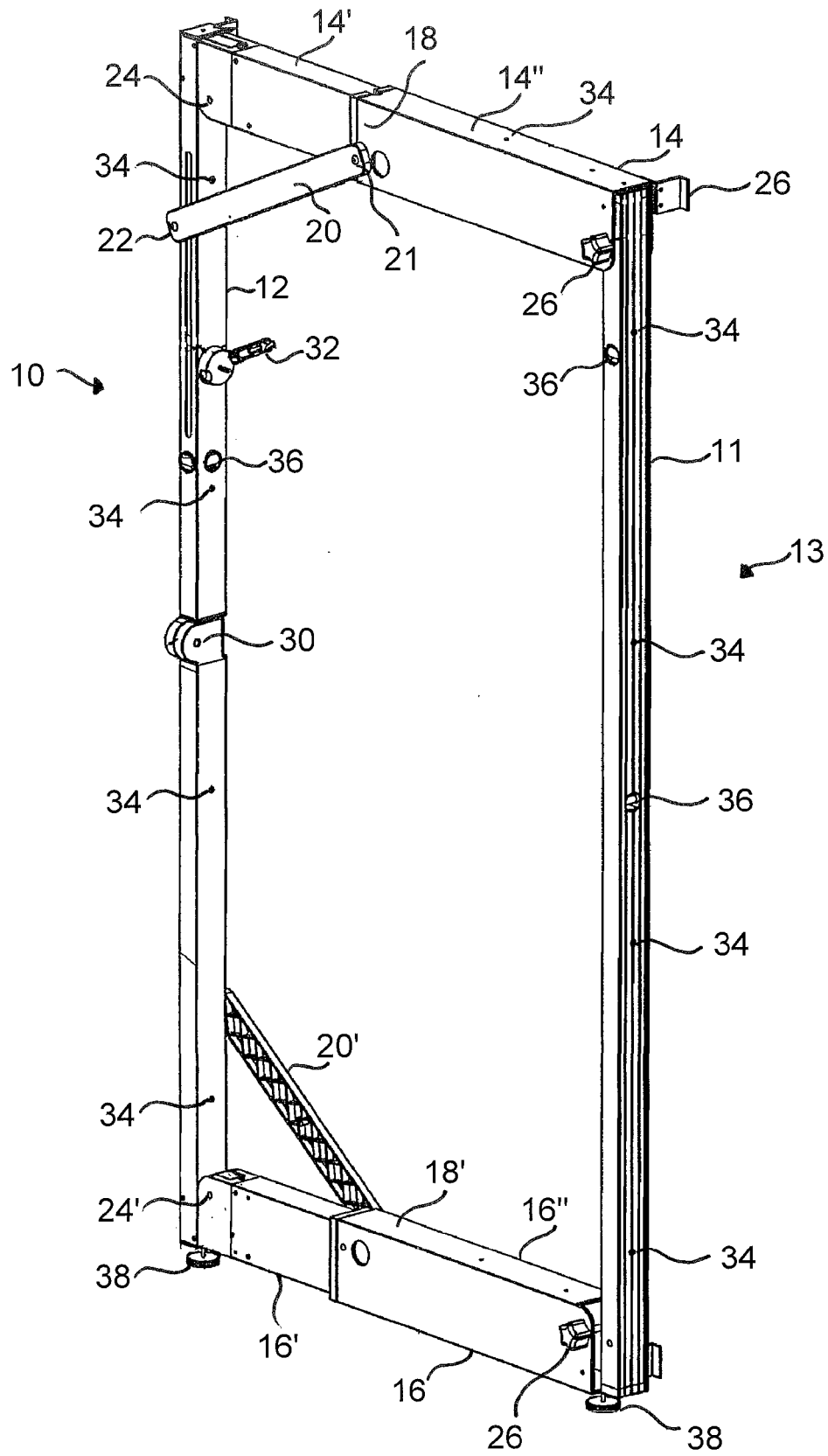


FIG. 1

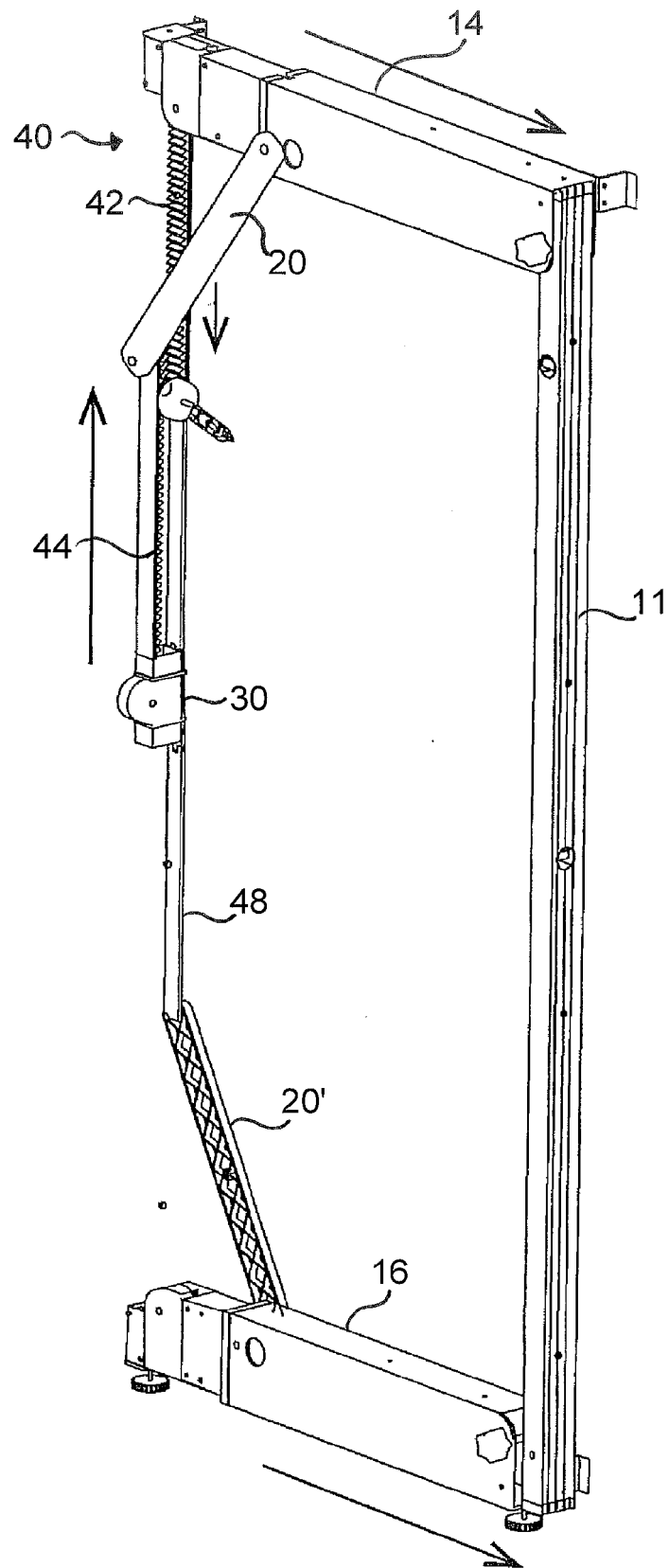


FIG. 2

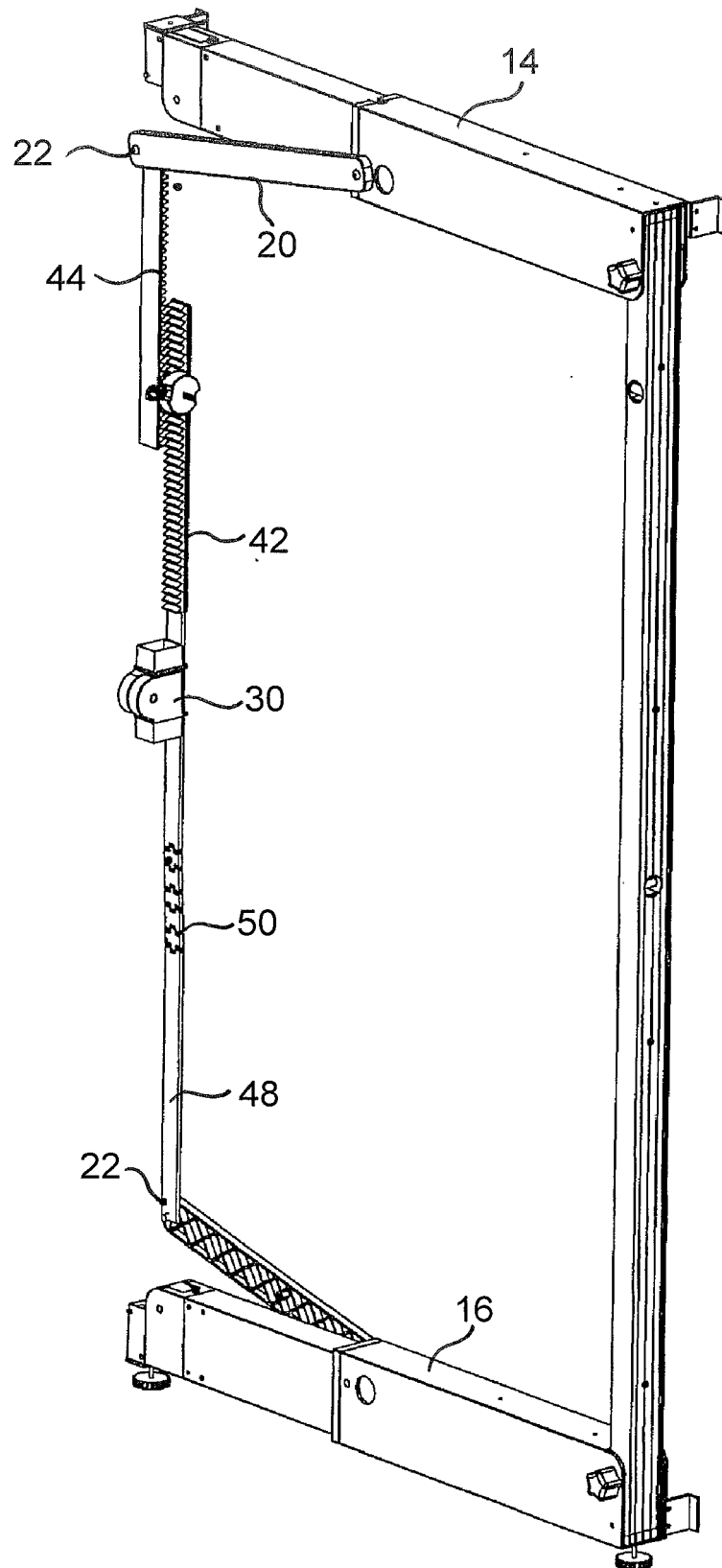


FIG. 3

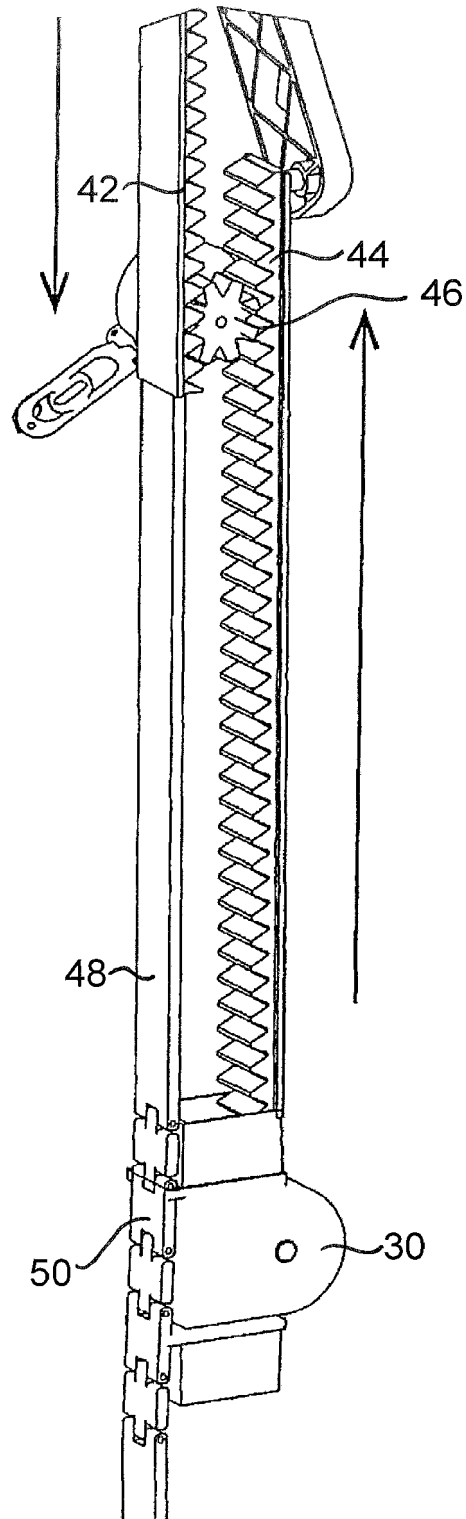


FIG. 4

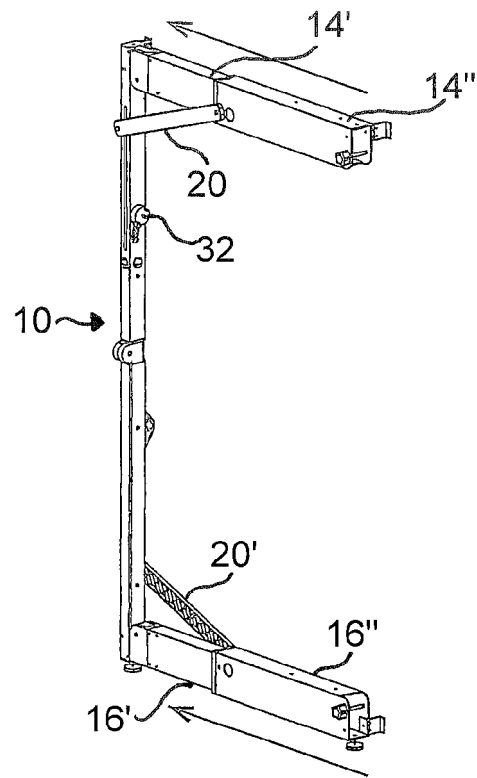


FIG. 5

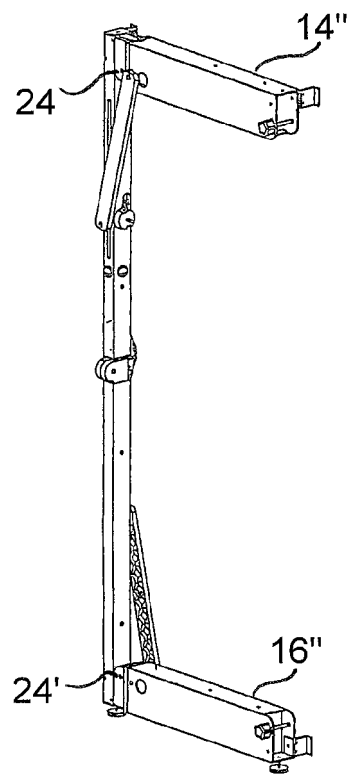


FIG. 6

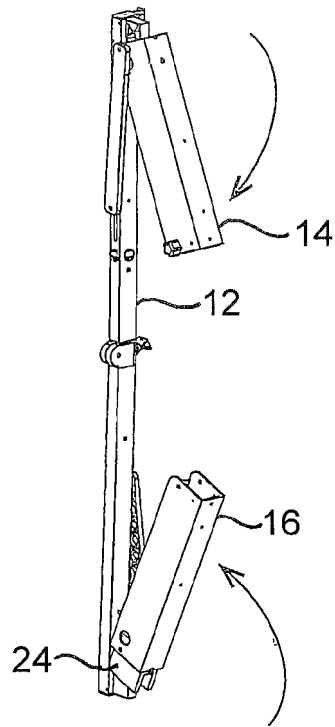


FIG. 7

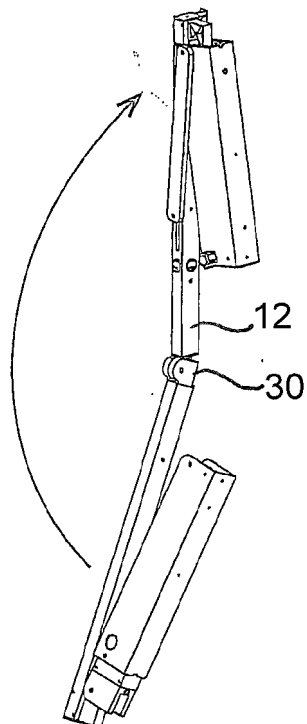


FIG. 8

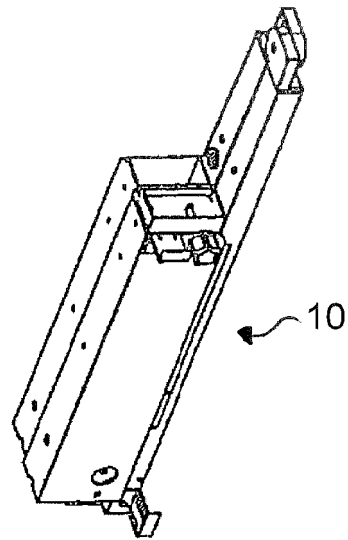
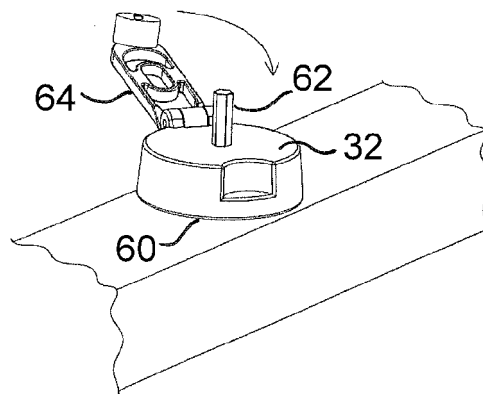
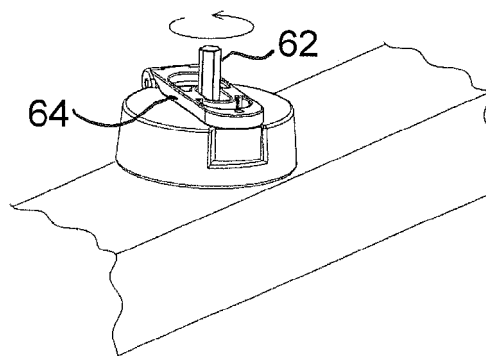


FIG. 9



(a)



(b)

FIG. 10



EUROPEAN SEARCH REPORT

Application Number
EP 17 15 2983

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 3 065 550 A (PATTIANI ALOIS W) 27 November 1962 (1962-11-27) * column 2, lines 13-17 * * column 2, line 50 - column 4, line 33; figures 1,12 * * column 5, lines 5-18 * -----	1-3,5,6, 9,10, 12-14	INV. E06B1/60 E04F21/00
A	US 1 595 164 A (MUNDY CHARLES F ET AL) 10 August 1926 (1926-08-10) * the whole document * -----	1-14	
A	US 2013/333296 A1 (LYONS DECLAN ANTHONY [IE] ET AL) 19 December 2013 (2013-12-19) * figures 1-4 * * paragraph [0054] - paragraph [0055] * -----	1-14	
A	US 2 771 688 A (BAKER HAROLD E) 27 November 1956 (1956-11-27) * the whole document * * figure 1 * -----	1-14	
			TECHNICAL FIELDS SEARCHED (IPC)
			E06B E04F
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 7 August 2017	Examiner Hellberg, Jan
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 17 15 2983

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

07-08-2017

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3065550	A	27-11-1962	NONE
US 1595164	A	10-08-1926	NONE
US 2013333296	A1	19-12-2013	NONE
US 2771688	A	27-11-1956	NONE

15

20

25

30

35

40

45

50

55

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82