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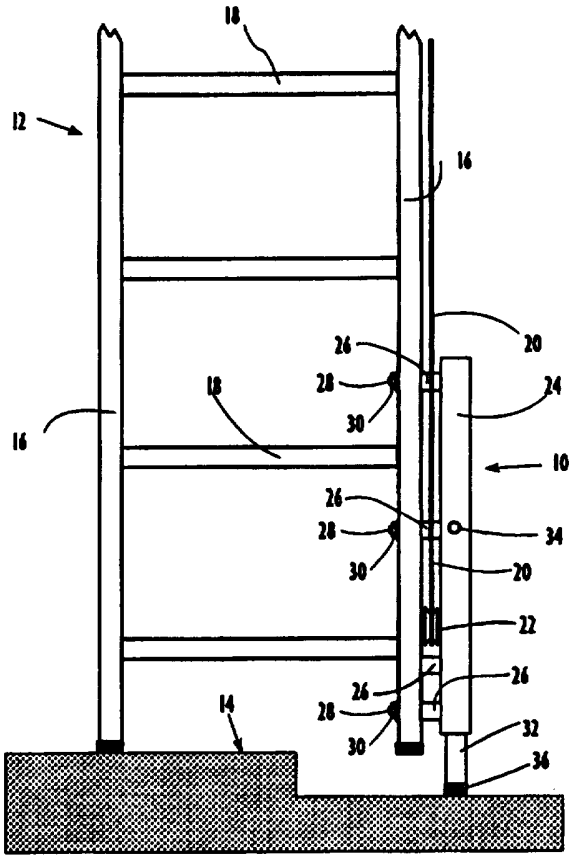
(54) Title: STABILISER ATTACHMENT FOR LADDERS

(57) Abstract

An attachment (10) for use with a ladder (12) to stabilise or level it when used on uneven ground (14) is disclosed in this specification. It basically comprises a tubular metal casing (24) of rectangular section within which a jack-leg (32) is slidingly located, the lower end of the jack-leg (32) extending from the bottom of the casing (24) and being fitted with a non-slip foot (36). The extension of the jack-leg from the casing is determined by the use of a transverse bolt or pin (34) that passes through both the casing (24) and a selected one of a row of holes in the jack-leg (32). The attachment includes spacer blocks (26) which mount studs or bolts (28) that pass through holes drilled in the stile (16) of the ladder (12) and are used to secure the attachment to the ladder by means of nuts (30). The attachment can be fitted to any type of ladder with stiles of any section or material and does not interfere with pulleys (22) and ropes (20) commonly used in extension ladders.



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TITLE STABILISER ATTACHMENT FOR LADDERS

TECHNICAL FIELD

This invention relates attachments for use with ladders to facilitate their stabilisation or levelling on uneven ground. It is particularly concerned with attachments adapted to be secured to the bottom of ladder stiles and which employ extensible jack-legs.

BACKGROUND TO THE INVENTION

Many ladder-stabiliser attachments with extensible jack-legs have been proposed in the art. Though the problem appears to be simple, the existence of so many alternative designs indicates that the appearance is deceptive. This is particularly the case where, as in the present invention, it is desired to provide an attachment which can be fitted to a wide variety of ladders including those made from timber or aluminium extrusions, those with solid or hollow rungs, those with or without extension pulleys, etc. The stabiliser attachment needs to be light yet strong, simple yet foolproof, easy to permanently attach to a ladder, and able to operate reliably despite frequent exposure to water, sand and mud. Stabiliser attachments which are strong, heavy and complex either require two men to erect the ladder or must be attached to a ladder after it has been erected and detached before it can be stowed for transport. As a result, few such attachments are actually used by busy workmen, even though they may perform excellently as stabilisers in the most demanding situations. Stabilisers which are simple, convenient to use and capable of being permanently attached to ladders tend to lack ruggedness and strength and are often only capable of being fitted to ladders of a specific type, model or make.

US patent 4,744,441 discloses a stabiliser attachment using metal jack-screws engaged with metal nuts that are bolted to the ladder stiles, the bottoms of the jack-screws having ball-joints that engage with foot-pads. The metal screw and nut arrangement, and the ball-jointed foot, are prone to seize under field conditions, while the relatively thin screws are liable to be bent if the ladder is

dropped or roughly handled. US patent 4,209,078 discloses an attachment which uses a more substantial jack-leg that slides in a tubular casing, the top of the jack-leg being supported by an adjustment screw fitted to the top of the casing. However, the screw mechanism is still likely to seize under field conditions and the design of the attachment is ill-suited to many types of ladders. Australian patent application 49131/93 discloses an attachment which comprises a horizontal beam structure adapted to support the bottom of a variety of ladders and pair of weather-sealed telescoping screw-jacks mounted on each end of the beam structure. But this attachment is so heavy and cumbersome that it makes the ladder difficult to erect, take-down and transport. While it has been proposed (eg, US patent 5,044,468) that hydraulic jacks may be used instead of screw-jacks in stabilising attachments, they will not be lighter and present a new set of reliability, safety and cost problems.

Another class of prior art attachments for stabilising ladders employ friction-clamps to hold their jack-legs in position, either within a cylindrical casing or directly against the stiles of the ladder. However, reliance on frictional clamping is fundamentally unwise from a safety standpoint: it is not possible to visually check that the clamp is tight, dirty clamps can feel tight but not grip the jack-leg properly and dirt or oil can allow a jack-leg to slip even when the clamps are tightened normally. For example, US patent 4,872,529 discloses the use of long tubular telescoping stabiliser attachments which are frictionally clamped internally by a twisting action. US patent 5,082,088 employs jack-legs that slide in cylindrical tubes fixed to the ends of a transverse beam (which is secured to the base of a ladder), the position of each jack-leg being set by a screw-clamp. US patent 5,181,584 and German patents 3,503,170 and 4,405,584 disclose a simpler arrangement in which channel-section, slidable jack-legs are clamped directly to the stiles of a ladder, the jack-legs being longitudinally slotted in US patent 5,181,584 to take the clamping bolts. Apart from the afore-mentioned safety and reliability problems, such jack-legs and clamps must be designed to fit specific ladders and are entirely unsuited to ladders fitted with extension pulleys, or ladders having I-section stiles.

Another class of prior art attachment employs sliding jack-legs which are frictionally clamped in place but which have a number of predefined positions for the jack-leg in its casing. Examples are UK patent 1,578,143 in which the jack-leg has a pin which slides in a slot in a cylindrical casing tube, the slot being laterally enlarged at various points to define preferred locations for the pin. French patents 2,665,924 and 2,701,058 disclose the use of sliding jack-legs which are fitted within tubular-form ladder stiles, the jack-legs being provided with detents to take a spring-loaded ball fixed in the stile. A screw-clamp or locating pins are provided to hold the jack-leg under load. It will be appreciated that the latter stabilisers are not attachments but, in fact, an integral and important part of the ladder design. Not only must the stile have an appropriate tubular section, but the lower rungs of the ladder must be attached in a special manner (since they cannot pass through the stile.

OBJECTIVES OF THE INVENTION

It is the general object of this invention to provide an attachment for use in stabilising or levelling ladders which will overcome one or more disadvantages of the prior art as outlined above. Desirably, the attachment should be simple, effective and safe in use, as well as being suited for use with a wide variety of ladders.

OUTLINE OF INVENTION

The present invention is based upon the realisation that a simple, rugged, reliable and foolproof attachment suitable for fitting to a wide variety of ladders can be provided if a rectangular metal casing having a sliding jack-leg therein is provided with spacer blocks between it and the ladder stile. These blocks allow the casing to stand clear of the pulleys and ropes commonly used in extension ladders, and, to stand clear of the ends of the ladder rungs where (as in many aluminium ladders) they protrude through the stiles. The blocks also enhance the stiffening effect provided by the casing to the bottom of the ladder stiles. A simple but safe and effective way of adjusting the position of the jack-leg within the casing is to employ a row of holes in the jack-leg through which a bolt or pin can be fitted, the

bolt or pin passing through a pair of holes formed in the casing and, therefore, being removable from outside the casing.

Preferably, in the interests of safety, the row of holes in the jack-leg is so positioned with respect to the pair of holes in the casing (through which the fixing bolt or pin is fitted) so that the lowermost hole in the row will not be exposed below the bottom of the casing, even when the bolt or pin is fitted into the topmost hole of the row. This ensures that the portion of the jack-leg which is weakened by the row of holes is always reinforced by the casing.

The spacer blocks are provided with fastener means whereby they may be secured to the stile of a ladder, the fastener means conveniently comprising screw-threaded studs. Preferably, the blocks are formed from metal and are welded (in spaced relation to one another) to one side of the casing. The stud is preferably formed by screwing a bolt or screw through the block so that the head of the bolt or screw is accommodated in a recess formed in the face of the block which buts against the casing. In this way, the stud is effectively and permanently captured in the block in such a manner that it cannot work loose and will always support the ladder when the jack-leg is in use.

It is also desirable that the bolt or pin that passes through the jack-leg be arranged so that it lies in a plane which is orthogonal to that of the bolts or screws fitted to the spacer blocks; that is, the axes of the holes in the jack-leg and the casing are parallel to the side of the ladder stile to which the attachment is secured. It is also desirable but not essential that, as is conventional in the art, the jack-leg is provided with a non-slip foot which is either pivoted or fixed to the lower end thereof.

To effect adjustment of the jack-leg within the casing (when the device is secured to the lower part of a ladder stile), the through-bolt or pin is withdrawn, the jack-leg is slid into or out of the casing until the ladder is vertical and, then, the bolt is re-inserted so as to pass through the appropriate hole in the jack leg.

It will be appreciated that the attachment may be secured to either or both stiles of a ladder. All that is required to fit a jack-leg in position is to drill appropriately spaced holes to take the fastener studs which are associated with the blocks. The blocks both serve as spacers to position the casing in spaced parallel relation to the ladder stile and to provide secure mounting for the fixing studs.

Attachments of this type are well adapted for mounting on any type of ladder, including step ladders with tapered stiles, aluminium ladders with stiles of various sections, and ladders having rungs which project through the stile. They are light enough and small enough to be permanently attached to a ladder which is normally handled by one man, yet they are rugged and safe and capable of being used in muddy, sandy and wet conditions without operational impairment.

DESCRIPTION OF EXAMPLES

Having broadly portrayed the nature of the present invention, one example of the application of the above principles will now be described by way of illustration only. In the following description, reference will be made to the accompanying drawings in which:

Figure 1 is a front elevation of the attachment of the example secured to a parallel-sided ladder which is in use on a stepped surface,

Figure 2 is a front elevation of the attachment of the example secured to a tapering step ladder also in use on a sloping surface,

Figure 3 is a longitudinal section of the attachment of the chosen example,

Figure 4 is a transverse section of the attachment of Figure 3 taken on section A-A of Figure 3, the attachment being shown secured to the stile of an aluminium ladder.

With reference to Figure 1, the attachment 10 of this example is shown in use with an extension ladder 12 which is resting on a stepped surface 14, ladder 12 having stiles 16, rungs 18 and an upper extension element (not shown) which is lifted into place by a rope 20 which passes around a lower pulley 22. As indicated above, attachment 10 includes a metallic tubular casing 24 of rectangular cross-section which is secured to the lower part of the outside face of a stile 16, the casing in this example being open at the top and the bottom. Casing 24 is spaced from the stile by four spacer blocks or stand-offs 26 which ensure that it is clear of the lower extension pulley 22 and that it does not interfere with the associated rope 20. Casing 24 is attached to stile 16 by studs 28 which are located in blocks 26 and pass through holes in the style to be secured by nuts 30. A jack-leg 32 is slidingly located within casing 24 and protrudes from the bottom of the casing to engage surface 14, jack-leg 32 being located in position within casing 24 by a transverse pin or bolt 34 which passes through the front and rear faces of the casing. A rubber foot 36 is secured to the bottom of jack-leg 32 so as to reduce the likelihood of it slipping on surface 14.

In this example, attachment 10 is fitted with four spacer blocks or stand-offs 26 which are unevenly spaced so that at least two, and preferably at least three, can be located clear of rungs 18. Those which can be so located are, of course, secured to the stile by the studs and nuts 28 and 30. It will be appreciated that an attachment 10 can be secured to each stile 16 of ladder 12.

Figure 2 shows a shorter version of attachment 10 (with the same reference numerals indicating the same parts as in the attachment of Figure 1) fitted to a step-ladder 40 resting on a sloping surface 42. Ladder 40 has rungs 44 and stiles 46. In this version of attachment 10, only two spacer blocks or stand-offs 26 are secured to the casing 24, but the attachment is secured to the ladder by studs 28 and nuts 30 in the same manner as described with respect to Figure 1. It will be appreciated that each stile 46 of ladder 40 may be tapered from top to bottom (as is conventional with step ladders) without in any way affecting the fitting of attachment 10.

Figures 3 and 4 show attachment 10 in more detail and, while the same reference numerals are used to indicate the same parts as in the attachment of Figures 1 and 2, it will be observed that the attachment shown in Figures 3 and 4 is fitted with three spacer blocks or stand-offs 26 (rather than four as in Figure 1 or two as in Figure 2). It will be seen that casing 24 of attachment 10 is of rectangular tubular section with open upper and lower ends 50 and 52 respectively. I have found that an aluminium extrusion (with passivated internal and external surfaces) serves the purpose well. Jack leg 32 is also of rectangular section such that it will slide freely within casing 20 without undue play. While jack-leg 32 may also be formed from a similar aluminium section, I prefer to make it from a solid high-grade timber which is suitably treated against moisture ingress and rot. Through-bolt or pin 34 passes transversely through both casing 24 and jack-leg 32 from front to back, being held in place by snap-spring 54 fitted to its tail end (which may slotted for the purpose). This allows bolt or pin 34 to be pushed and secured in place from the front of the attachment with one hand. It may then removed by first pressing snap-springs 54 together and then pulling the pin out. If desired, pin 34 may be formed as a bolt and fitted with a conventional nut and washer instead of snap-springs 54.

A row of holes 56 is drilled transversely through jack-leg 32 so that the most appropriate one (for the slope of the ground) can be engaged by pin 34. A pair of aligned holes 57 are also formed in the front and back faces of casing 24 to take the pin 34. However, the row of jack-leg holes 56 and the location of casing-holes 57 is such that the lower-most jack-leg hole 56 is not exposed below the bottom of casing 24 when the upper-most hole is engaged by pin 34 (when passing through casing holes 57). This ensures that the part of jack-leg 32 which is weakened by holes 56 is always reinforced by casing 24. Since most of the strain on the ladder stiles is from front-to-back, rather than side to side, it is also preferable that the side face of jack-leg 32 (and of casing 24) is longer than its front and rear faces (as will be evident from Figure 4).

In the arrangement shown in Figures 3 and 4, spacer blocks or stand-offs 26 are

conveniently formed from solid aluminium and are drilled and threaded to take stainless steel or monel screws which form studs 28, the holes in blocks 26 being counter-sunk to take the heads of screws 28. Nuts 30 are fitted to the end of bolts 28. Finally, blocks 26 are welded to the side of casing 24 as indicated at 58 in Figure 3. Thus bolts/studs 28 cannot work loose in blocks 26.

Attachment 10 is secured to the stile of a ladder by studs 28 and nuts 30, after appropriately holes have been drilled in the stile to take studs 28. Preferably, one attachment is secured to each stile. Before use, jack-legs 32 will normally be in their highest position so that the bottom of stiles 16 extend beyond the bottom of the jack-legs. Since the attachments are light, the ladder can be manoeuvred into place by one man in the normal manner. If the ground is uneven one stile will be unsupported and, to stabilise the ladder, bolt 34 in of the attachment on the unsupported side is removed by compressing snap-spring 54 and withdrawing the bolt to allow jack-leg 32 to drop onto the ground. If a hole 56 in the jack-leg is not aligned with holes 57 in the casing, the base of the ladder is moved inwards or outwards a little to achieve such alignment, and bolt 34 is then re-inserted through casing holes 57 and the aligned hole 56 in jack-leg 32. After use, the ladder can be lowered and in the normal manner without the need to adjust (let alone remove) the attachments 10. As already noted, the ladder may be an extension ladder and, if so, the extension can be raised and lowered without interference with the attachments.

While the examples of the attachment described with reference to the drawings meet all the objectives of the present invention, it will be appreciated by those skilled in the art that many alterations and additions can be made without departing from the scope of the invention as defined by the following claims. For example, the casing may have a closed upper end to stop dirt from entering from the top of the casing.

CLAIMS:

1. An attachment for use in stabilising or levelling ladders on uneven ground, the attachment comprising:

- an elongate tubular metal casing of rectangular cross-section having upper and lower ends, at least the lower end being open,
- a pair of holes in opposite sides of said casing arranged on an axis which is substantially horizontal and orthogonal to said sides,
- a plurality of spacer blocks secured to one side of the casing and spaced one from the other along the casing,
- fastener means associated with each block for securing the block, and thus the casing, to the outer side face of a ladder stile so that the casing is arranged in spaced parallel relation therewith,
- a jack-leg of rectangular cross-section slidably mounted within the casing having a lower end projecting from the open lower end of the casing,
- a row of holes formed in said-jack leg such that each hole is adapted to be aligned with said pair of holes in the casing by sliding the jack-leg within the casing, and
- a through bolt or pin passing through the casing holes and a selected one of said jack-leg holes to locate the jack-leg in the casing.

2. An attachment according to claim 1 wherein said pair of holes in the casing and said row of holes in the jack-leg are positioned so that, when said through bolt or pin passes through the casing holes and the uppermost jack-leg hole, the lowermost jack-leg hole is not exposed below the bottom end of the casing.

3. An attachment according to claim 1 or claim 2 wherein: said fastener means comprises a bolt or screw which has a body that is screw-threaded along substantially its entire length and which has a head at one end thereof, said head being of larger diameter than said body, said spacer block is drilled and tapped to take the body of the screw and is recessed on one side to accommodate said head, and wherein the spacer block is

formed from metal and is welded to the casing so that said head is located at the interface between the casing and the spacer-block.

4. An attachment according to claim 3 wherein the holes in the casing are formed in the sides of the casing which are adjacent to the side to which the spacer blocks are welded so that said axis is substantially parallel to the side face of the ladder stile to which the attachment is secured, when the attachment is in use.

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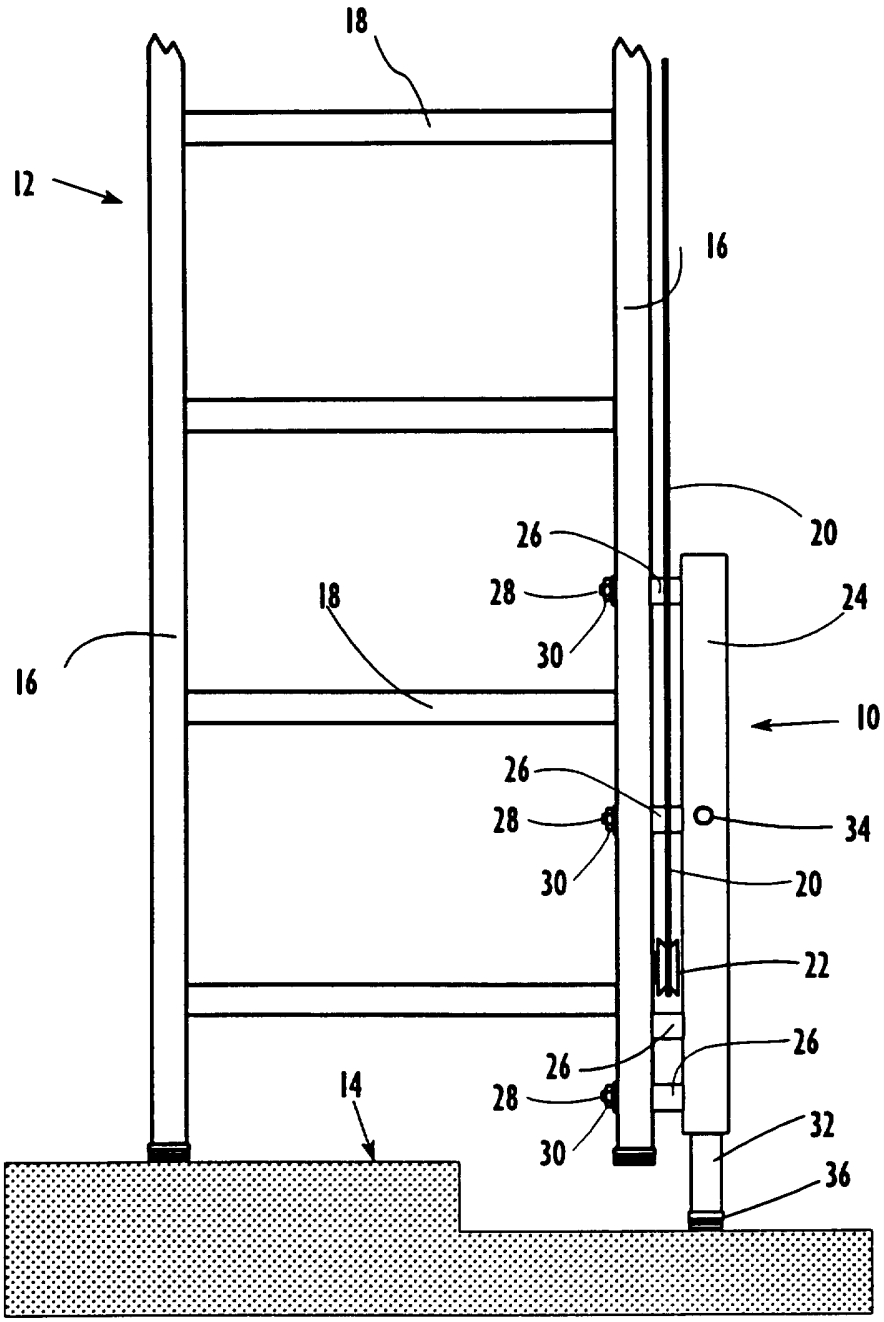

FIGURE 1

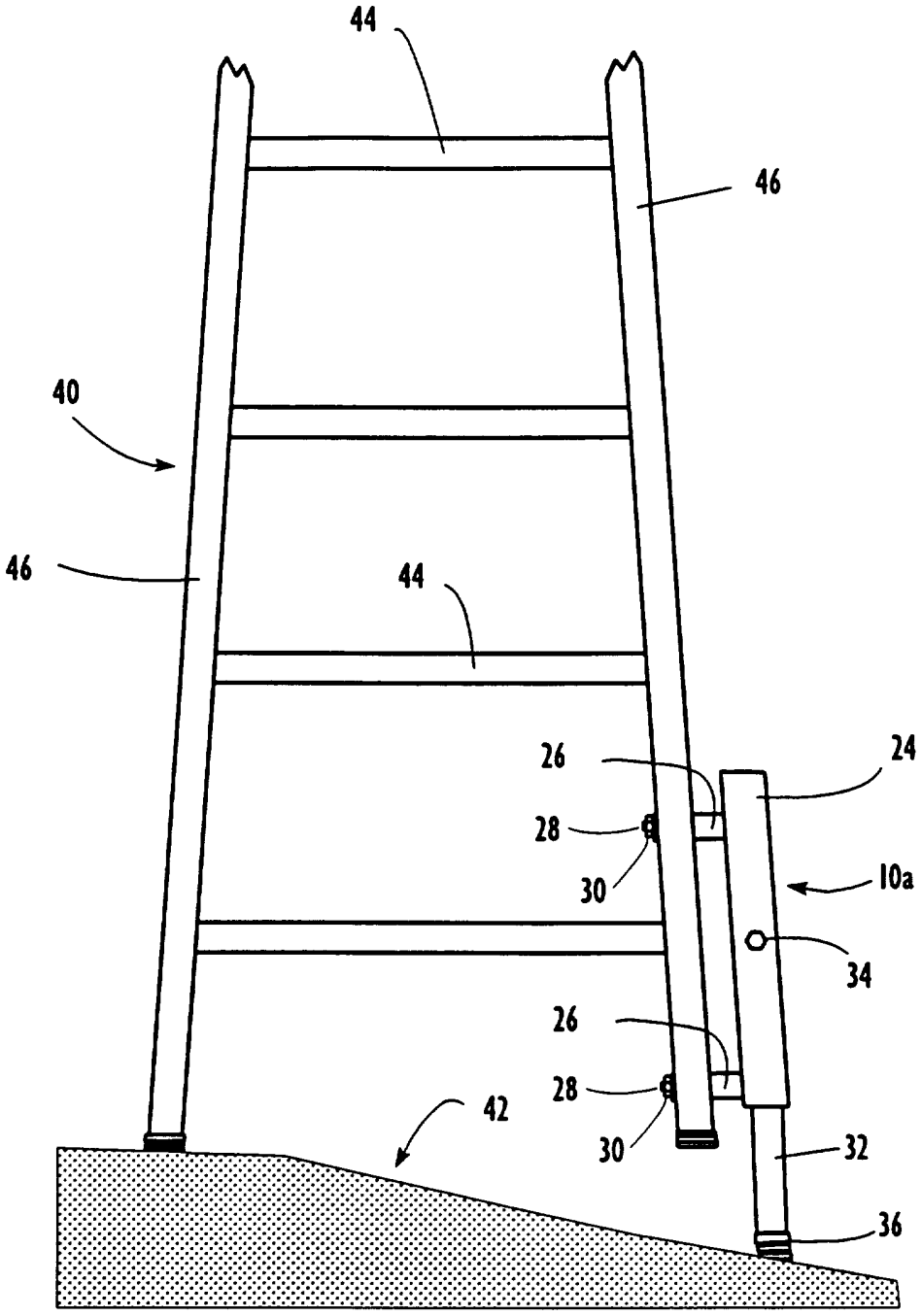

FIGURE 2

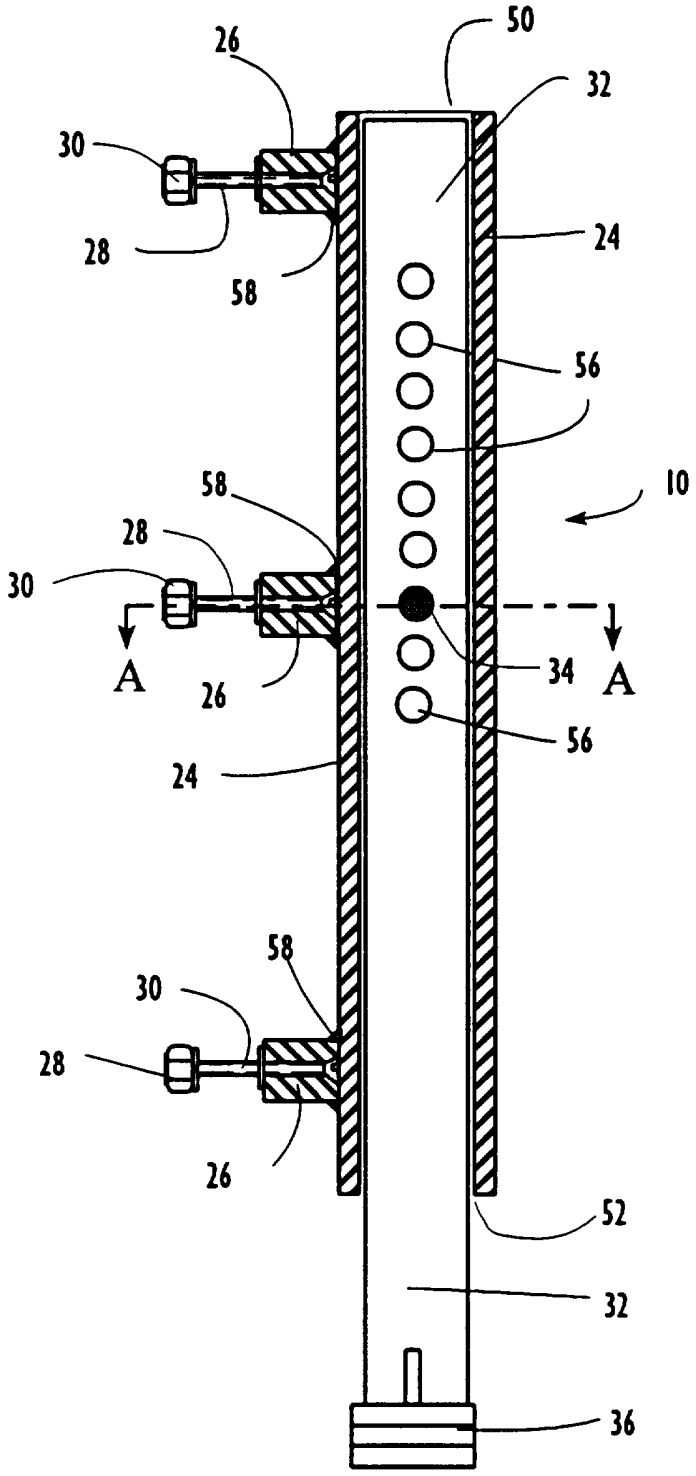

FIGURE 3

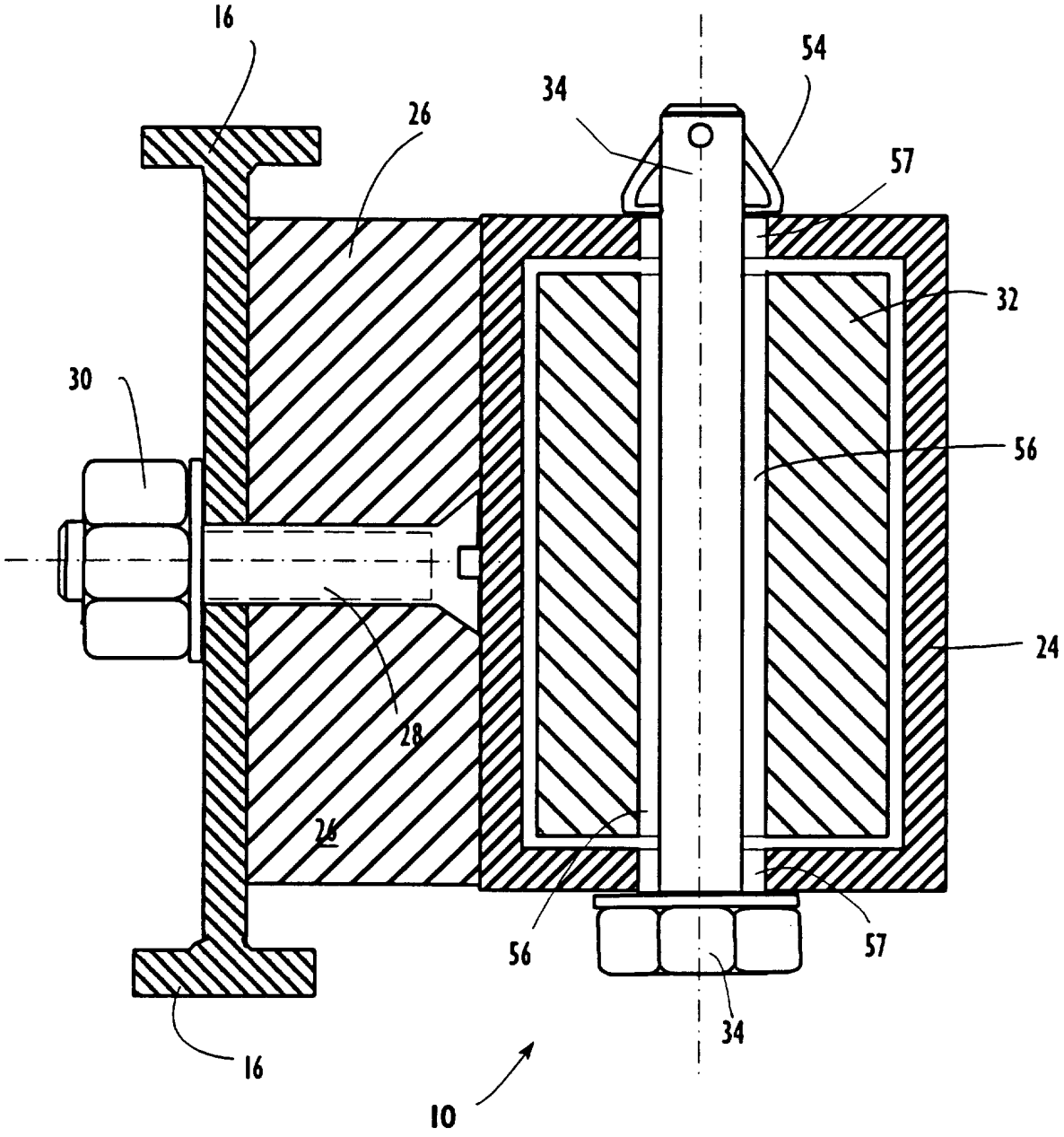

FIGURE 4

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/AU 96/00128

A. CLASSIFICATION OF SUBJECT MATTER

Int Cl[6]: E06C 7/44

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC : E06C 7/44

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
AU : IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, 4423797 A (BATTEN) 3 January 1984 col 6, line 62 - col 7, line 49, figs 8, 9	1, 2
Y	fig 2	1, 2
Y	US, 5325936 A (BAKER) 5 July 1994 col 3, lines 52, 53 figs	1,2
Y	US, 4607726 A (DAVIS et al) 26 August 1986 col 4, lines 3-35, figs	1, 2

[X] Further documents are listed in the continuation of Box C

[ ] See patent family annex

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Date of the actual completion of the international search	Date of mailing of the international search report
30 May 1996	5TH JUNE 1996.
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INTERNATIONAL SEARCH REPORT

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C (Continuation) **DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, 3394774 A (LANIER) 30 July 1968 col 4, lines 4-6, figs 1, 2	1, 2
A	US, 4236603 A (TALLEY) 2 December 1980 abstract, fig 1	
A	US, 4091893 A (NEAL) col 2, lines 23-63, figs 1-3	
A	US, 3554321 A (STEDMAN) 12 January 1971 abstract, fig 1, 2	
A	US, 3428147 A (GORDON et al) 18 February 1969 col 2 lines 10-39, figs 4-7	
A	US, 3165170 A (BLANEY) 12 January 1965 whole specification	
A	US, 2936849 A (LARSON) 17 May 1960 col 2 lines 60-72, figs.	
A	US, 2783928 A (COX) 5 March 1957 whole specification	
A	US, 2581782 A (ANDERSON) 8 January 1952 whole specification	
A	FR, 2665924 A (CONVERS) 21 February 1992 claim 1, figs 1, 3	
A	DE, 1679046 A (SCHULTE) 11 February 1971 whole specification	
A	DE, 1429958 A (HARMS) 30 April 1969 whole specification	