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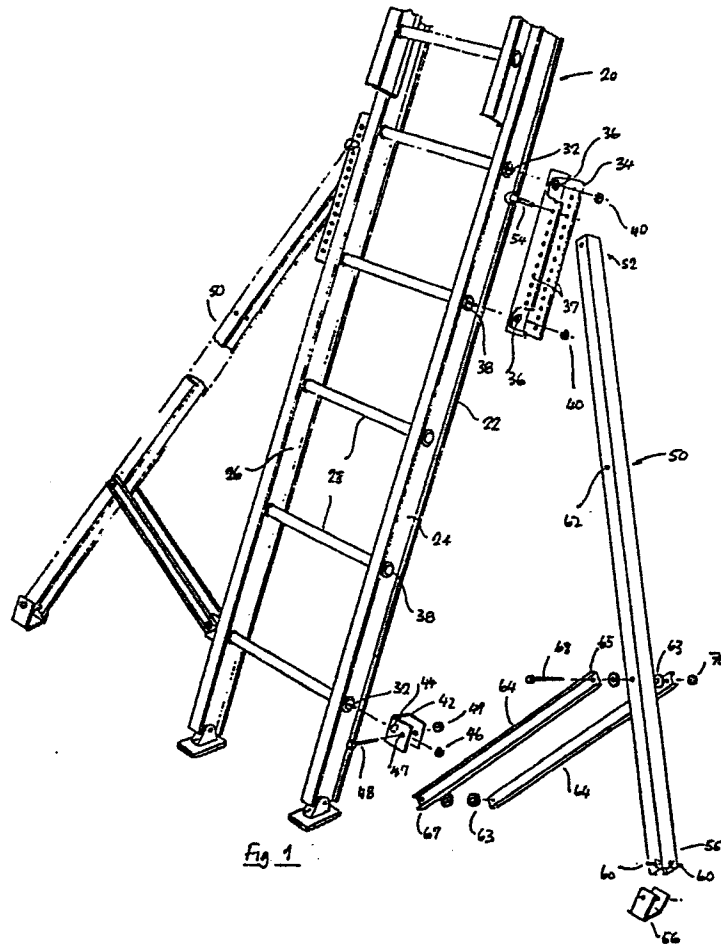
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(54) **Ladder stabilising device.**

(57) An adjustable stabilising device is described for attachment to an extension ladder (20) having hollow rungs (28) without requiring modification of the ladder structure or affecting normal operation of the ladder (20). In one embodiment, the device has two stabilising elements (30) located on either side of the ladder (20) and which are connected to each other using rods (32) which extend through the hollow rungs (28) of the ladder (20). Each stabilising element has an upper bracket (34) with a number of spaced apertures (37) to receive one end (52) of a support leg (50) and uneven ground can be accommodated by selecting the appropriate aperture to that foot (56) of the stabilising element lies on the ground. The stabilising elements have pivotable connections to permit the element be folded flat to lie on the sides of the ladder (20) for storage, and the stabiliser is designed to remain on the ladder (20) permanently without affecting normal ladder use.



The present invention relates to a ladder stabilising device for extension ladders having hollow rungs. More particularly, the invention relates to an adjustable ladder stabilising device which can be secured to one or to both sides of the ladder without interrupting the structural integrity of the ladder.

It has been proposed to provide the lower end of an extension ladder, or a step ladder, with stabilizing members which effectively decrease the tendency for the ladder to tilt laterally. In some of these proposals the stabilising devices can be adjusted such that the ladder can be located on uneven ground without having an increase in tendency to tilt. However, with most of the proposed devices, the connection between the stabilising device and the frame of the ladder involves drilling holes in the frame or inserting screws or the like which destroy the original structural integrity of the ladder. If the structure of the ladder is modified in any way to accept such stabilising devices, then the warranty on a ladder is invalidated. Consequently in industry, where the need for increased ladder stability is most needed, use of stabilising devices which require structural modification of the ladder structure results in invalidation of manufacturers warranty. This can cause liability and compensation problems if an accident occurs using a ladder which has had its structure modified.

A further disadvantage with such prior proposals is that the stabilisers are designed to be mounted on the ladder

before use and removed after use with the result that because of lengthy mounting requirements they are frequently not used at all. Also if such stabilisers are left on the ladder their movement and storage of the ladder is awkward and is a further reason for their lack of widespread use.

Additionally any height adjustment of such stabilisers to accommodate uneven ground is complex because many parts are required resulting in a complex and expensive device. Because adjustment is awkward and frequently lengthy this further mitigates against the widespread use of such devices.

An object of the present invention is to obviate or to mitigate the above said disadvantages.

Broadly, the invention solves the problem of providing a ladder stabiliser suitable for widespread use without destroying the structural integrity of the ladder by connecting a stabilising device to the ladder through the hollow rungs of the ladder. The stabilising device is rapidly movable on the ladder between an in-use and an out-of-use position where the stabiliser lies along the side of the ladder and which allows the ladder to be stored easily and used with minimal time and effort.

In one aspect of the invention there is provided stabilising apparatus for use with a ladder having hollow rungs, the apparatus having at least one stabilising device locatable at one side of the ladder, the stabilising device having at least one first connecting means for extending through a rung of the ladder and being securable at the other side of the ladder, the stabilising device having base means for supporting the stabilising device on a surface, whereby in use, the stabilising device has on a surface adjacent the ladder and effectively

increases the base width of the ladder.

Advantages of the invention are mainly that the ladder does not have its structural integrity destroyed by mounting the stabiliser, the hollow rungs serve as guides for members of the stabilising devices which pass through the rungs and act as reaction portions for securing the stabiliser to the ladder. Because damage to the ladder is avoided, the manufacturers warranty is not invalidated which is attractive to those dealing with insurance claims and workers compensation claims. Because the stabiliser folds up on the ladder to an out-of-use position it always remains on the ladder so it is readily usable and can be stored like a normal ladder with the stabiliser in the out-of-use position. The stabiliser is also height adjustable so that the feet of the ladder can be moved to accommodate the height of the ladder on uneven ground. Also because the height adjusting means are located at the upper end of the stabiliser the height can be easily and rapidly adjusted by the user without stooping as is required with prior proposals.

Another advantage of the ladder stabiliser is that a spring loaded pin is used to retain the stabiliser in a particular height position. This pin rapidly and easily secures the stabiliser legs to the ladder frame and is also used to retain the stabiliser parallel to the side of the ladder in an out-of-use position so that the stabiliser lies against the side of the ladder to facilitate transport and storage. The stabiliser has feet which are adapted to lie substantially flat when the stabiliser is used when the ladder is in an inclined position, to further improve stability and to prevent the ladder

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moving away from the surface it is leaning against. The ladder stabiliser is made using inexpensive, easily manufactured parts which pivot relative to each other in such a way that the stabiliser can lie flat against the ladder side for storage.

Also, two stabilisers can be attached to each other through the rungs of the ladder, or a single stabiliser can be mounted to one side of the ladder using parts secured through the ladder rungs. Also stabilisers on opposite sides of the ladder can be used independently and this is particularly suitable if the ladder is near a wall or fence. Some prior proposals do not readily demonstrate this flexibility of use.

In a one embodiment of the invention there is provided stabilising apparatus for use with a ladder having hollow rungs, the stabilising apparatus having at least two stabilising devices, at least one stabilising device being located on each side of the ladder, each stabilising device having upper and lower bracket means connected together by linked upper and lower longitudinal members, the respective upper and lower members of the stabilising devices being connected together by respective rods which extend through the rungs of the ladder, whereby, in use, the lower longitudinal members lie adjacent a surface and increase the effective base width of the ladder.

Preferably each stabilising device is adjustable by varying the point of securement between the upper bracket means and the upper longitudinal members to alter the attitude of lower longitudinal member for support on the surface adjacent its side of the ladder.

An embodiment of the present invention will now be

described by way of example with reference to the accompanying drawings in which:-

Fig. 1 is a front perspective and partly exploded view of the lower end of an extension ladder with two stabilisers in place according to a preferred embodiment of the invention.

Fig. 2 is a front elevational view of an extension ladder with one stabilising element shown in-use with uneven ground and the other stabiliser folded up and stored on the side of the ladder;

Fig. 3 is a view taken on line 3-3 of Fig. 2 to a larger scale with both stabilisers secured to the ladder.

Fig. 4 is a view taken on the lines 4-4 of Fig. 2 to a larger scale to show how the stabiliser members are located for storage, and;

Fig. 5 is a view taken on lines 5-5 of Fig. 4 showing how a swivel foot is mounted to a stabiliser leg.

Referring now to Fig. 1 of the drawings, an aluminum extension ladder, generally indicated by reference numeral 20, has a lower section 22 with sides 24, 26 interconnected by hollow rungs 28. As will be later explained, identical stabilising element 30, generally indicated by reference numeral 30, are connected to each other by threaded rods 32, which pass through the rungs of the ladder and each stabilising element 30 is independently adjustable.

One stabilising element 30 will be described in detail although it will be appreciated that like numerals refer to like parts on the other stabilising element 30. A stabilising element 30 consists of an upper elongate U-shaped bracket 34 which has spaced apertures

36 in its base to register with rung-holes 38 to receive threaded bars 32 which pass through the ladder rungs. Nuts 40 are used to secure the bracket on the rods so that it lies against the side 24 of the ladder. The bracket has a plurality of aligned spaced apertures 37 in each leg of the U to locate the upper end of the stabilising leg and for adjusting the height of the stabiliser support as will be described.

A lower U-shaped stabilising bracket 42 also has an aperture 44 for registering with a rung-hole 38 for receiving a threaded rod 32, so that the bracket can be secured against the ladder side by nut 46. The bracket has aligned apertures 47 in the legs to receive a pin 48 for locating a stabilising strut for pivotal movement about the pin axis as will be described.

A steel stabilising leg 50 has a generally U-shaped cross section and its upper end 52 has aligned apertures 53 for registering with a respective pair of apertures 37 and is secured thereat by a spring loaded pin 54. The lower end 55 of the leg 50 has a swivel foot 56, pivotally mounted thereto by a bolts 60, for contacting the ground for support. The leg 50 has an aperture 62 intermediate its ends for permitting the stabiliser to be secured to the bracket 34 when the stabiliser is in a folded position. The stabiliser leg 50 is connected to bracket 42 by a pair of U-shaped struts 64 for bracing the leg against the side of the ladder. The struts are mounted at the leg end 65 by a pin 68 and nut 70 which permits relative pivotal movement between the struts 64 and the leg 50. The struts are also pivotally mounted at the ladder end 67 by the pin 48 and a nut 49 as shown in the assembled stabiliser section on the other side of



the ladder. The pivotable connections at the ends of the struts allow each stabilizer section to be folded between an in-use position as shown and an out-of-use and storage position as shown in Fig. 3, the operation of which will be later described.

Fig. 2 shows a front view of a ladder with a stabilising element 30 folded up into a storage position at the side and the other stabilising element 30 shown in two possible different positions so that the foot of the stabiliser is supported on an uneven surface. In the folded position it will be appreciated that the leg and strut follows the path during folding as indicated by the arrows. In the folded position the swivel foot 56 of the leg 50 lies on the side 24 of the ladder above the bracket 42 and the leg is secured to the bracket by the pin 54 which passes through two sets of aligned apertures as best seen in Fig. 3. Thus the leg and stabilising element 30 does not substantially increase the width of the ladder or its thickness and storage of the ladder is not affected.

Fig. 2 also illustrates that each stabilising element 30 can be rapidly adjusted to accommodate uneven ground. For example, the end 52 of the leg 50 is secured by pin 54 to the lowermost apertures 37 in bracket 34 to locate the foot 56 beneath the feet of the ladder. The stabiliser section can be easily and rapidly moved to another position, shown by a broken line, for example when the ground at the side of the ladder is higher than the ground under the feet of the ladder. In this position the upper end 52 is shown secured to the top end of the bracket.

Fig. 3 shows a sectional view along the line 2-2 in

Fig. 1, when the stabilising elements 30 are assembled. It will be seen that threaded rod 32 passes through the hollow rung 28 of the ladder and through respective apertures 36 in bracket 34 and the bracket 34 is secured to the side of the ladder by nuts 40. The base 35 of the U-bracket 34 has a member projecting section 39 in which the apertures 36 are located and which securely fits in the rung hole 38 to assist in locating and securely mounting the bracket.

On the right hand side of Fig. 3 it will be seen that the generally U-shaped channel section of leg 50 is received with U-shaped bracket 34 and that pin 54 passes through aligned apertures 37 and 62. Struts 64 are also shown. The pin 54 is held in place by spring 57 which must be displaced inwardly by force, e.g. by pulling or pushing to pass the pin 54 through an aperture. On the left hand side of Fig. 3 the leg 50 is shown extending outwardly and downwardly as in Fig. 2.

Fig. 4 is a sectional view taken along the line 4-4 in Fig. 2 and illustrates the mounting of the foot 56 to the leg. The foot 56 overlies the leg and is secured thereto by bolts 60 which pass through each side of the leg to be secured by nuts 61. The outwardly extending threaded ends of the bolts and nuts are accommodated in the distance between the struts 64 by using spacing washers 63 to space the struts from the leg 50 and bracket 42 as described above.

The shape of the foot 56 is best seen in Fig. 5. The foot has a flat base 72 and sides 74, 76 inclined at an angle of  $17^{\circ}$  to the base so that when the ladder is resting at an incline of  $17^{\circ}$  the base 72 of the foot rests flat on the ground to give maximal

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surface contact and to further prevent the risk of the ladder sliding away from the wall.

It will be appreciated that mounting of the stabiliser to an aluminum extension ladder will not affect normal extension or relative movements of the ladder section as seen in Fig. 1 because the ladder extension portion lies within the base portion.

It will be appreciated that various modifications may be made to the embodiment hereinbefore described without departing from the scope of the invention. For example, although two stabilisers are preferred, a single stabiliser could be used to provide an effective increase in the ladder base width. Also the threaded rods 32 may be replaced by rods drilled and tapped to receive internally threaded bolts or countersunk screws which would lie flush with the base of U-bracket 34. Also it will be appreciated that the strut could be connected between the ladder and any other position on the leg 50, for example at the foot 56, but for storage it will be appreciated that apertures 62 would need to be moved towards lower end of the leg. Also the bracket at the upper end could be secured using only a single rung and the bottom bracket lengthened to be secured using two rungs. In addition, although the stabiliser device is described for use with aluminum extension ladders it will be appreciated that it could be used with a non-extension ladder with hollow rungs. The stabiliser components are made of steel but it will be appreciated that aluminum or any other suitable material could be used.

1. Stabilising apparatus for use with a ladder (20) having hollow rungs (28) and comprising:

at least one stabilising device (30) having first (34) and second (42) bracket means for securing the stabilising device at respective upper and lower positions along a side (24) of the ladder;

each bracket means being coupled to one end of at least one elongate rod (32) which can be passed through a hollow rung and its other end secured to the other side (26) of the ladder;

a first elongate member (50) having one end (52) adapted to be removably coupled to the upper bracket means, and its other end (55) for acting as a foot of the stabilising device for effectively increasing the base width of the ladder;

a second elongate member (64) shorter than the first elongate member having one end (67) pivotably connected to the lower bracket means, and its other end (65) pivotably connected to the first elongate member, the pivotal connections permitting pivotal movement in the plane of the ladder;

the stabilising device being movable between an in-use position and a stored position; whereby in the in-use position the first elongate member is displaced at an angle from the side of the ladder by said second elongate member which acts as a supporting strut, to locate the other end of the first elongate member at a distance from the foot of the ladder and effectively increase the base width of the ladder, and in the stored position said first and second elongate members can be folded to lie along the side of the ladder and retained therein by retaining means (54).

2. Apparatus as claimed in claim 1 including means for adjusting the height of the foot of the first longitudinal member relative to the foot of the ladder, said height adjusting means being provided by said upper bracket means (34) having a plurality of locations (37) spaced in the direction of the ladder, and to any one of which said one end (52) of the first elongate member (50) can be secured by said retaining means (54).

3. Apparatus as claimed in claim 1 or claim 2 wherein said retaining means is a spring-loaded pin (54).

4. Apparatus as claimed in any preceding claim wherein a stabilising device (30) is securable to each side (24,26) of the ladder, the elongate rods (32) being fastened between respective pairs of upper (34) and lower (42) brackets.

5. Apparatus as claimed in any preceding claim wherein the locations are apertures (37) located in a plate lying in the plane of the ladder, and the first elongate member has an aperture (62) adapted to register with one of the plurality of apertures (37) when the stabiliser is in the stored position, and said stabiliser being retained in the stored position by a spring loaded pin (54) which can be passed through said registered apertures (37,62).

6. Apparatus as claimed in any preceding claim wherein the upper bracket means (34) is coupled to two elongate rods (32) which pass through respective rungs of the ladder and which are fastened at the other side (26) of the ladder.

7. Apparatus as claimed in any preceding claim wherein the second elongate (64) member has its other end (67) pivotably connected to the first longitudinal member intermediate its ends.

8. Apparatus as claimed in any preceding claim wherein said second elongate member has its other end (67) pivotably connected to the first elongate member at the other end (55) of the first elongate member.

9. Apparatus as claimed in any preceding claim wherein the other end (55) of the longitudinal member has a swivel foot (56) connected thereto, the swivel foot being movable between in-use and out-of-use positions, and in said in-use position the foot has a base (72) which lies substantially parallel to the surface on which it is supported.

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10. Apparatus for use with a ladder (20) having hollow rungs (28) and comprising:

a pair of stabilising devices (30) each adapted to be located on either side (24,26) of the ladder and each having first (34) and second (42) bracket means for securing the stabilising device at respective upper and lower positions along a side of the ladder, the first bracket means (34) being connected to ends of two elongate rods (32) which can be passed through two adjacent rungs (28) of the ladder and which are fastened to the first bracket means (34) of the other stabilising device at the other side of the ladder, the second bracket means (42) being connected to an end of an elongate rod (32) which can be passed through a lower rung of the ladder and which is fastened to the second bracket means (42) of the other stabilising device at the other side of the ladder;

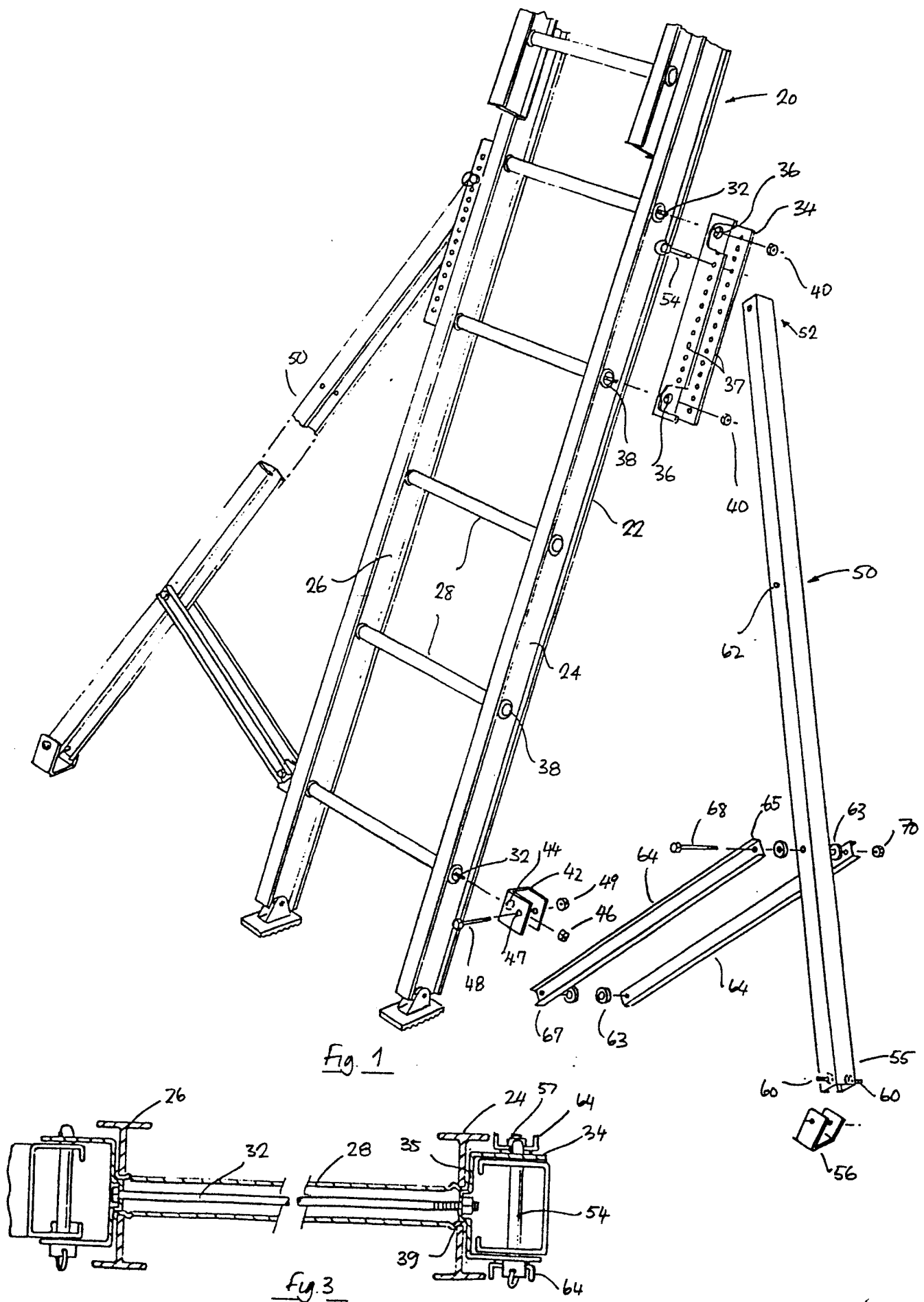
each first bracket means (34) having a plate in the plane of the ladder and extending lengthwise of the ladder, the plate having a plurality of apertures (37) spaced in the direction of the ladder, each stabilising device having a first rigid elongate member (50) having an aperture (54) at one end (52) which is registrable with one of said plurality of apertures (37), said first rigid elongate member and said bracket being secured by a spring-loaded pin (54) which can be passed through said registered apertures, the other end (55) of the

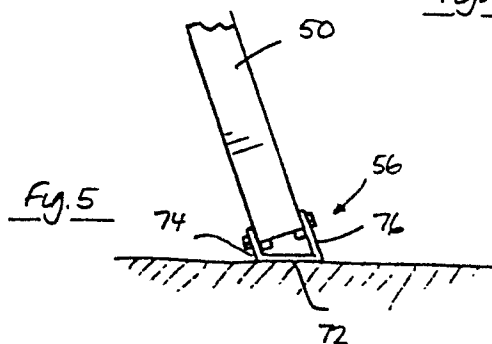
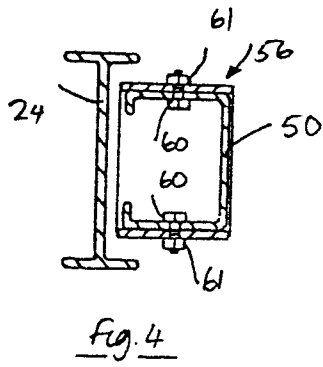
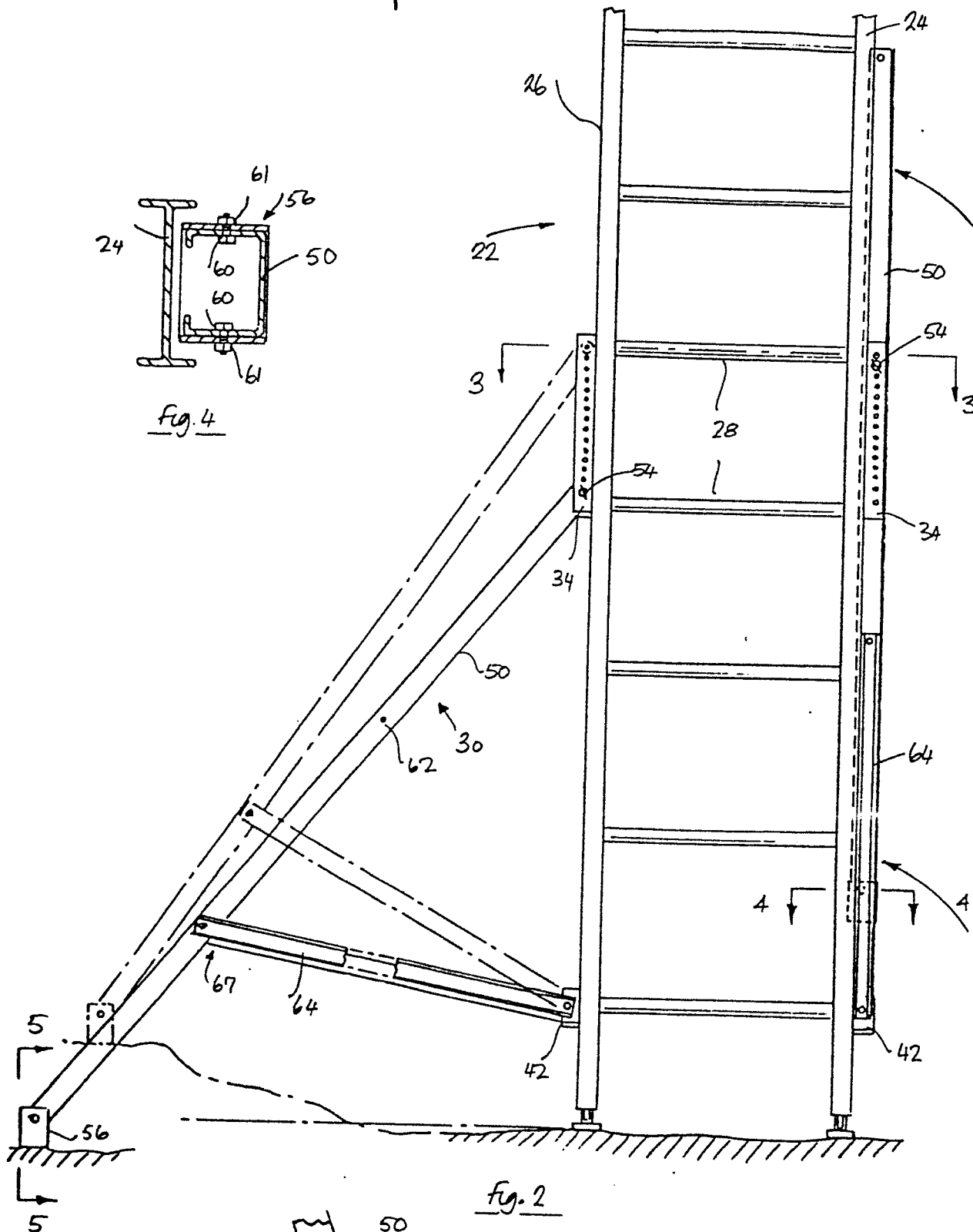
first rigid elongate member having a foot (56) for supporting the stabiliser and the ladder, and effectively increasing the base width of the ladder,

each stabilising device having a second rigid elongate member (64) shorter than the first rigid elongate member and having one end (67) pivotably connected to the lower bracket means (42) and its other end (66) pivotably connected to the first elongate member (50) at a location intermediate its ends, said pivotal connections permitting movement of the first and second elongate members in the plane of the ladder.

each first elongate member having an aperture (62) intermediate its ends for facilitating storage of the stabiliser, each stabiliser being movable independently between an in-use position and a stored position; whereby in the in-use position, the or each second elongate member spaces the first elongate member from the side of the ladder at an angle so that the lower end (55) of the second elongate member is spaced from the foot of the ladder and acts as a foot effectively extending the base width of the ladder, and the upper end (52) of the or each second rigid elongate member is height adjustable relative to the feet of the ladder by selectively securing said upper end (52) of said first elongate members (50) with the respective upper bracket (34) by said spring-loaded pins (54) with one of said plurality of apertures (37), and in the stored position the first and second elongate members of the or each stabilising device are foldable to lie along the side of the ladder and the or each stabiliser can be retained in said stored position by passing said spring-loaded pin (54) through one of said plurality of apertures (37) registering with intermediate aperture (62).









DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
Y	NL-A-7 707 754 (BURG & MULS B.V.) * Page 1, lines 13-28; page 2, lines 15-31; claims 1-5; figures 1,2 *	1,2,4, 5,7-10	E 06 C 7/42
Y	--- US-A-3 933 221 (V.H. SORENSON) * Column 1, lines 22-31, 53-65; column 2, lines 24-32; claim 1; figures 1-3 *	1,2,4, 5,7-10	
A		6	
A	--- GB-A-2 053 334 (SACOME INTERNATIONAL S.A.) * Page 1, lines 14-28, 41-88, 101-114; abstract; claims 1,2,4; figures 1-3 *	1-5,7, 8,10	
			TECHNICAL FIELDS SEARCHED (Int. Cl. 4)
			E 06 C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 01-04-1985	Examiner CHESNEAUX J.C.
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	