

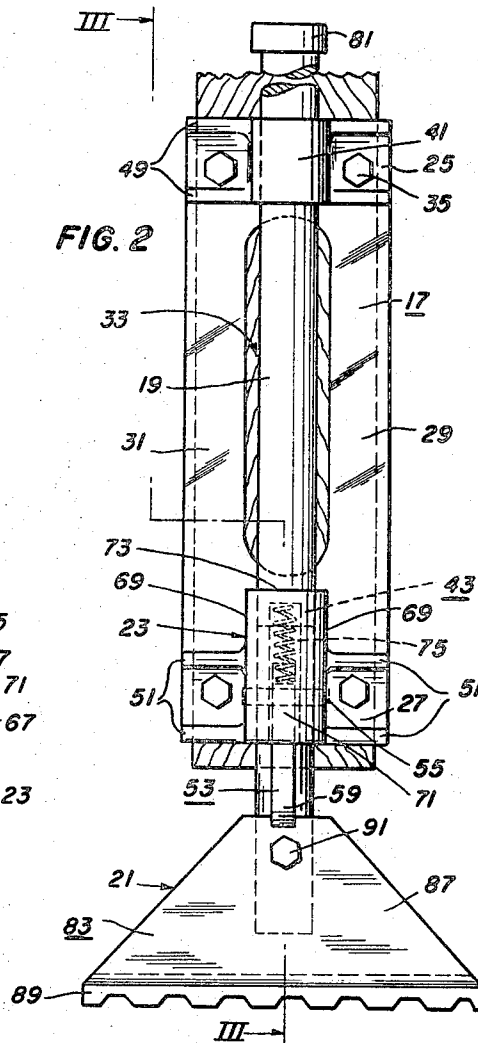
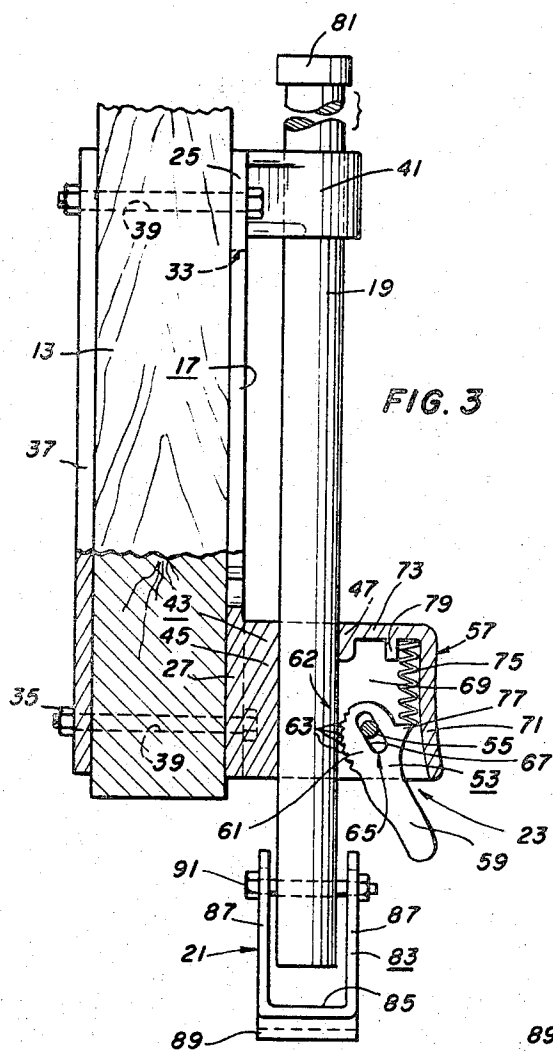
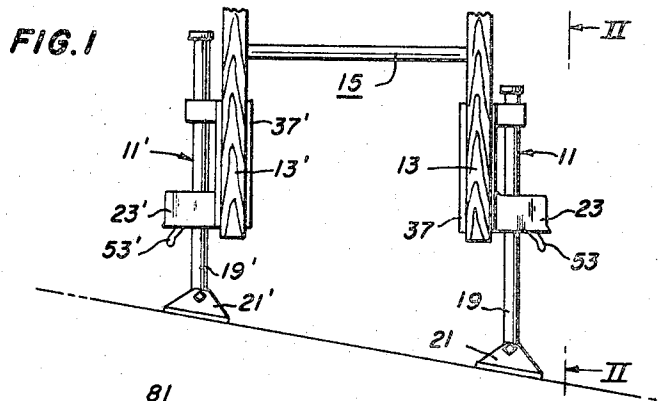
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LADDER SUPPORTING SURFACE COMPENSATING MEANS

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**LADDER SUPPORTING SURFACE
 COMPENSATING MEANS**
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ABSTRACT OF THE DISCLOSURE

An adjustable ladder leg extension assembly or two such assemblies adapted to be attached respectively to one or both lower leg portions of a ladder for supporting the ladder equally on both legs and for supporting the ladder perpendicularly in an upright disposition irrespective of the slanted or unlevel condition of the ground or ladder supporting surface.

Background of the invention

Many adjustable ladder leg extension devices have been devised for lengthening or shortening the effective length of a ladder leg. Some of the prior devices are complicated. Others are hard or troublesome to operate or are expensive to manufacture and market; for various reasons many of the devices have not functioned properly. One problem associated with prior devices is the difficulty of adjusting the device while wearing gloves; a gloved workman experiences considerably difficulty in manipulating the screws and other adjustment elements of prior art devices. Another problem associated with prior ladder leg extension devices is that often the attachment of such devices requires considerable deformation or wood-removal of the existing ladder leg structure in order for the ladder leg to properly accommodate the leg extension device. When much wood or ladder leg material is removed, the ladder leg is weakened and in many instances the ladder is made unsafe for supporting a workman.

Summary

The ladder leg extension assembly of this invention is adapted to be installed on a ladder and the like with only a small change in the existing ladder structure; the assembly of the present invention when in an installed disposition, clamps the leg portion of the ladder and in fact strengthens the ladder leg portion.

The ladder leg extension assembly of the invention is quickly and easily operable even by a workman wearing gloves.

The ladder leg extension assembly is substantially mechanically simple and does not include sleazy or intricate parts to malfunction.

The ladder leg extension assembly includes a positive acting pivotally secured check pawl for positively holding the assembly at a selected position or extension.

The ladder leg extension assembly is economical to manufacture and market.

Brief description of drawing

FIG. 1 is an elevational view of the lower portion of a ladder and illustrates a pair of leg extension assemblies operably secured on the legs of the ladder.

FIG. 2 is a side elevational view of a leg extension assembly taken as on the line II—II of FIG. 1 but showing the assembly in a retracted disposition.

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FIG. 3 is a front elevational and partly sectionalized view of the leg extension assembly taken as on the line III—III of FIG. 2.

Description of the preferred embodiment

The preferred embodiment of the leg extension assembly of the present invention is illustrated in FIGS. 2 and 3; the preferred application of the invention (illustrated in FIG. 1) is in the securing of an assembly on each leg of a ladder. Although the present invention is described in relationship to the legs of a ladder, it will be understood that the present invention can be applied to the legs of other like structures supported from the ground, as for example, scaffolding, without departing from the spirit and scope of the present invention. Thus, when the term "ladder and the like" is used, it is deemed to include such structures.

The right and left leg extension assemblies indicated 11, 11' respectively are shown mounted on the lower leg portions 13, 13' of ladder 15 (fragmentarily shown). Leg extension assemblies 11, 11' are alike and the following detailed description of assembly 11 will suffice for assembly 11' also.

Leg extension assembly 11 includes basically a long plate-like vertical frame 17, a vertical rod 19, a foot member 21 secured on the lower end of rod 19 and a check pawl mechanism 23 for checking the relative upward movement of rod 19. Frame 17 is generally rectangular and includes an upper portion 25, a lower portion 27, and right and left intermediate portions 29, 31 respectively (see FIG. 2). Frame portions 25, 27, 29, 31 define substantially a long oval through aperture 33. Frame 17 is adapted to be secured on ladder leg 13 by threaded fasteners 35 and backing plate 37. Preferably four threaded fasteners 35 extend respectively through bore openings 39 in ladder leg 13 and suitable openings in backing plate 37 and frame 17 and secure the assembly on ladder leg 13.

Upper and lower bearing portions 41, 43 integrally secured respectively on upper and lower frame portions 25, 27 movably support rod 19 from frame 17; rod 19 is bi-directionally displaceable and freely rotatably secured in bearings 41, 43 and in substantially parallel arrangement with frame 17. Lower bearing portion 43 is considerably larger than upper bearing portion 41 and includes a vertical base portion 45 and a generally horizontal circumferential portion 47 integrally secured with base portion 45 and circumferentially embracing rod 19. Upper and lower bearings 41, 43 include respectively paired oppositely extending web portions 49, 51 for reinforcing the respective bearings.

Check pawl mechanism 23 basically includes a check pawl member 53, a pawl pivot pin 55 extending through member 53, and support structure 57 supporting pawl member 53 from frame 17. Check pawl member 53 includes a handle portion 59 and an elongated flattened head portion 61 integrally secured to and extending longitudinally distant from handle portion 59. Head portion 61 includes a rough surface 62 which preferably comprises a plurality of sharp projections 63 arranged serially in a plane curve and extending along a marginal portion of head portion 61. Sharp projections 63 preferably are in the form of sharp-edged serrations extending respectively transversely of the edge portion of the check pawl head portion. Pawl member 53 includes structure defining an

oval-shaped or slot-shaped aperture 65 struck horizontally transversely through the pawl member head portion. Aperture 65 is partially defined by a substantially straight cam or locking surface 67 running obliquely in head portion 61 and running downwardly and progressively distant from the plurality of sharp projections 63. It will be understood that there is a cam action provided by surface 67 so that the greater the downward force exerted by pin 55 against surface 67 (as when a weight is supported by ladder 15) the greater will be the force urging projections 63 against rod 19. In other words, check pawl mechanism 23 automatically compensates for an increased downward force on the ladder 15 by gripping the rod 19 harder. Pawl support structure 57 is generally channel-shaped or U-shaped in horizontal cross section. Support structure 57 includes parallel oppositely arranged side portions 69, 69 integrally secured to and based from lower bearing base portion 45; an end portion 71 integrally secured to and bridging side portions 69, 69; and a horizontal top portion 73 bridging side portions 69, 69 and integrally secured with lower bearing circumferential portion 47. Pivot pin 55 extends through aperture 65 with the opposite end portions thereof firmly secured respectively in suitable apertures in side portions 69, 69 of support structure 57. The curved configuration of serrated projections 63 of check pawl head portion 61 is adapted to tangentially separably engage a longitudinal peripheral surface portion of rod 19.

A helical compression spring 75 pivotally urges check pawl serrations 63 against the cylindrical surface of rod 19. The upper turns of spring 75 is stopped against the under surface of support structure top portion 73; the lower turns of the spring engages a spur-like projection 77 of check pawl head portion 61. A boss projection 79 depending from support structure top portion 73 and spanning side portions 69, 69 guidingly positions spring 75 in support structure 57.

Manually manipulating or pulling check pawl handle portion 59 outwardly (to the right as viewed in FIG. 3) compresses spring 75 and releases rod 19. Manually releasing handle portion 59 permits the handle portion to be turned inwardly (to the left as viewed in FIG. 3) under the influence of spring 75. When the check pawl is released, projections 63 engage rod 19 and check the relative upward movement of the rod. A cap member 81 fixed on the upper end of rod 19 prevents disengagement of rod 19 and frame 17 when check pawl member 53 is moved to a released disposition; cap member 81 is adapted to engage the upper surface of upper bearing portion 41 when the check pawl is released.

Foot member 21 is channel-sectioned and includes a body 83 including a bottom 85 and sides 87, 87. A generally rectangular sole 89 of rubber or semi-resilient material is secured as by adhesive to the under surface of bottom 85 of foot member body 83. A threaded fastener 91 extending through aligned apertures in sides 87, 87 and a diametrically extending aperture in rod 19 pivotally secures foot member 21 on the lower portion of rod 19.

When the invention is incorporated in a straight common ladder, it may be desirable to utilize only one leg extension assembly secured on only one leg of the ladder. Since many straight ladders may be as handily used by climbing on either side of the ladder, such a ladder may be inverted or turned around to accommodate a ground slope in a certain direction; with a ladder utilizing only a single leg assembly secured on one leg of the ladder, the ladder will be turned so that the assembly will always be downgrade. The preferred application of the invention, however, is in the securement of an assembly on each leg of the ladder. This is particularly true when the ladder is of the non-reversible type, or is of the type ladder accommodating a worker on only one side of the ladder.

In using a ladder (15) having incorporated therein leg extension assemblies (11, 11'), the user may obtain an equal support footing of foot members 21, 21' by holding

the ladder in an upright position and releasing a desired one of check pawl members 53, 53'. Under the influence of gravity, a released rod (19, 19') will drop and engage its foot member (21, 21') against the ground or supporting surface; the check pawl member (53, 53') may then be released to lock the respective rod (19, 19') and the ladder is then ready for use. Another and alternate manner in which extension assemblies 11, 11' can be caused to extend, is by the user pushing downwardly with his foot or hand on the top of rod 19, in which case it is not necessary to manually release check pawl members 53, 53' since the pawl members will allow movement of the rods in this direction.

Although the invention has been described and illustrated with respect to a preferred embodiment thereof, it is to be understood that it is not to be so limited since changes and modifications may be made therein which are within the full intended scope of this invention as hereinafter claimed.

I claim:

1. The combination with a ladder and the like having a pair of downwardly projecting oppositely arranged legs, of ladder supporting surface compensating means comprising a ladder leg extension assembly adapted to be secured on at least one leg of said pair of legs and including an elongated vertical frame; means securing said frame and said leg together in substantially parallel arrangement; a vertical rod; bearing structure secured on said frame movably supporting said rod substantially parallel with said frame and with said rod being bi-directionally axially displaceable relative to said frame; an elongated generally vertical check pawl including a handle portion, and a head portion having a through horizontal elongated aperture and having structure defining a rough surface extending generally in a vertical arc along a marginal portion of said check pawl head portion, and further with the check pawl aperture being defined partially by a generally straight locking surface running obliquely in said pawl head portion and running downwardly and progressively distant from said rough surface; a pivot pin extending through said check pawl aperture adapted for sliding engagement with said locking surface; and support structure firmly supporting said check pawl pivot pin with said rough surface being operatively engageable with a longitudinal peripheral surface of said rod.

2. The combination of claim 1 in which said rough surface comprises a plurality of serially arranged sharp projections.

3. The combination of claim 2 in which is included spring means for pivotally urging said sharp projections against said longitudinal surface portion of said rod.

4. The leg extension assembly of claim 2 which additionally includes a foot member having a sole portion and means pivotally securing said foot member on the lower end portion of said rod constituting the only movable connection between said rod and foot members.

5. The combination with a ladder and the like having downwardly projecting oppositely arranged legs, of ladder supporting surface compensating means comprising a ladder leg extension assembly adapted to be secured on one leg of said legs and including an elongated vertical frame having upper and lower portions; means securing said frame and said leg together in parallel arrangement; a vertical cylindrical rod; bearing structure including an upper bearing and a lower bearing secured respectively on the upper and lower portions of said frame and movably supporting said rod substantially parallel with said frame with said rod being rotatable and bi-directionally axially displaceable relative to said frame; an elongated generally vertical check pawl including a handle portion and an elongated flattened head portion arranged longitudinally distant from said handle portion, said head portion including a plurality of sharp projections arranged serially in a plane curve extending along a marginal portion of said check pawl head portion and including a

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through elongated horizontally extending aperture partially defined by a generally straight locking surface running obliquely in said head portion and running downwardly and progressively distant from said plurality of sharp projections; a pivot pin extending through said check pawl aperture; check pawl supporting structure integrally formed with said lower bearing and firmly supporting said check pawl pivot pin with said plurality of sharp projections being operatively separably engageable with a longitudinal surface portion of said rod; spring means pivotally urging said check pawl sharp projections against said longitudinal surface portion of said rod; and a foot

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member pivotally attached to the lower end portion of said vertical rod for engagement with the ladder supporting surface.

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