Aug. 30, 1966 J. F. MACHEN 3,269,486

LADDER HOLDER

Filed July 27, 1964 2 Sheets-Sheet 1

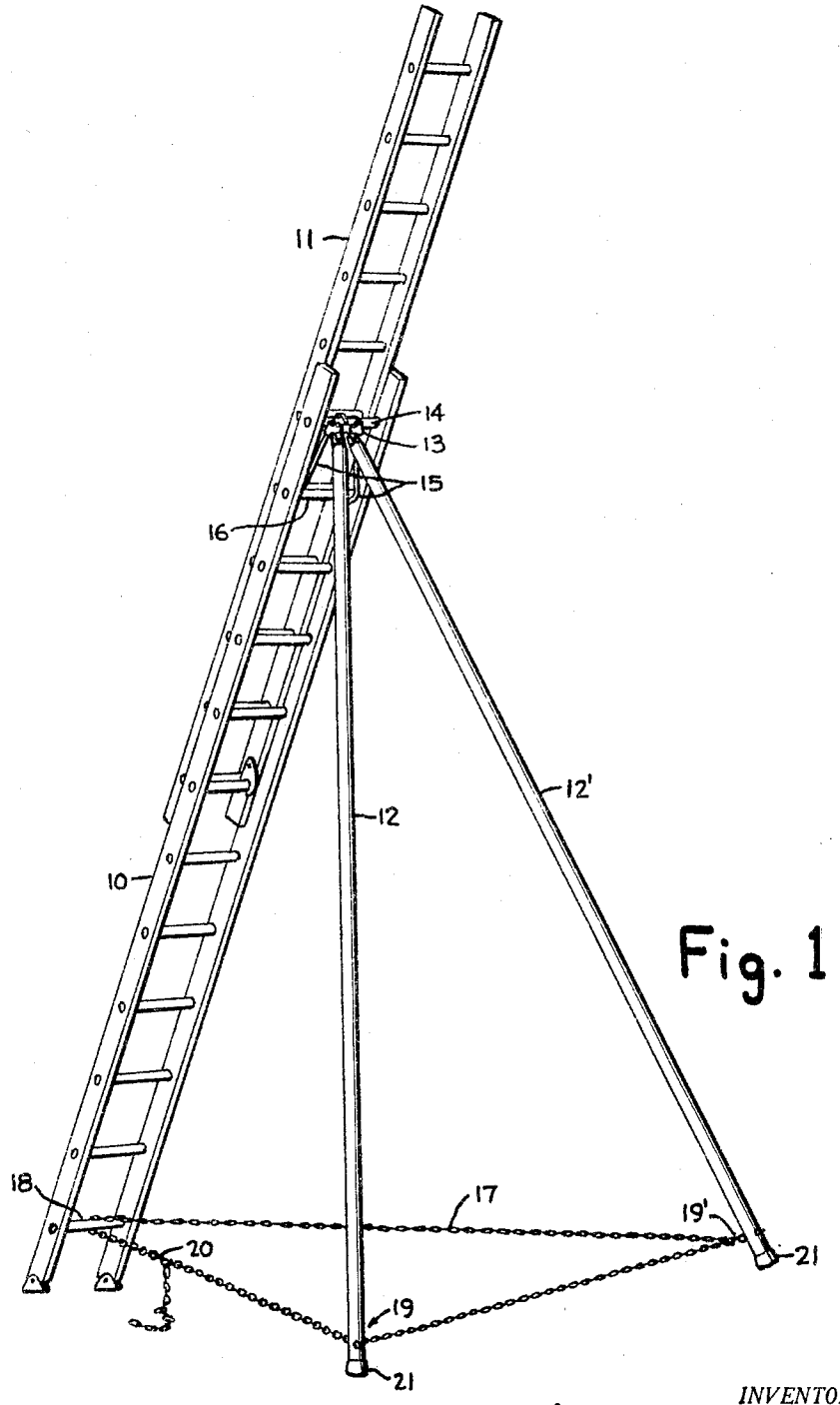


Fig. 1

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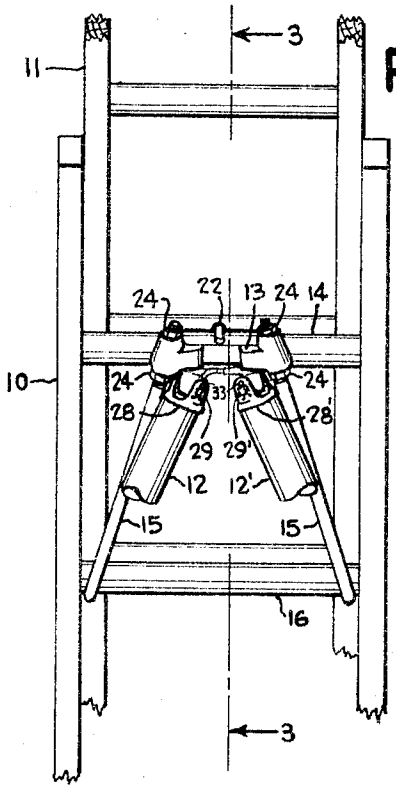


Fig. 2

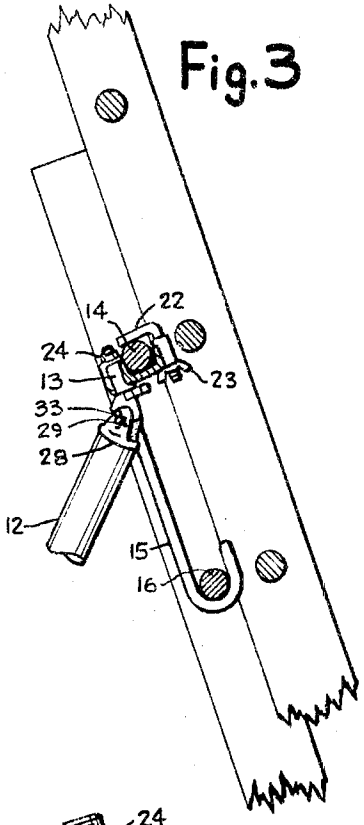


Fig. 3

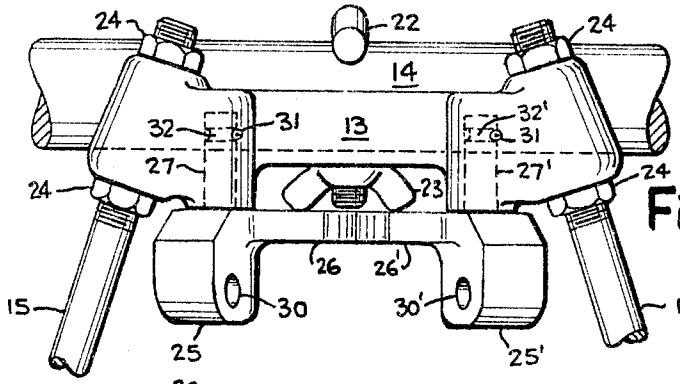


Fig. 4

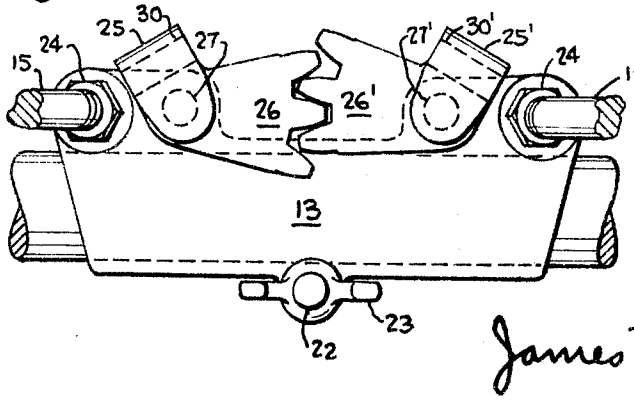


Fig. 5

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3,269,486

LADDER HOLDER

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1 Claim. (Cl. 182—170)

This invention relates to self-supporting ladders and more specifically to an improved self-supporting attachment for rung or extension ladders.

In many situations where it is necessary to obtain overhead access yet where a ladder cannot be leaned, it is often desirable to employ a rung or extension ladder made self-supporting my means of an accessory as set forth in my copending application for a Ladder Holder, Serial No. 308,706, filed September 13, 1964, now Patent No. 3,165,169. That application discloses an adjustable two-legged attachment which clamps to a ladder rung and makes it self-supporting when the legs are arranged in a tripod configuration with the ladder. Such a device offers advantages over scaffolding or other self-supporting equipment when reaching overhead 20 to 30 ft. because it is typically less cumbersome, faster to erect, and much less expensive.

Experience with ladder supports of this type has shown, however, that for the improved comfort of the climber a means to minimize ladder twisting would be highly desirable. Many light weight rung ladders are quite flexible in twisting, and unless the ladder is leaned or held in such a way that twisting is prevented at the point of support, the climber may feel somewhat uneasy when high on the ladder.

For ease of storage, it has also been found desirable to provide a means whereby the self-supporting accessory will fold against the ladder and may be stored without detachment. Without such a feature, it is necessary to detach the accessory and store it separately after each usage.

Accordingly, in addition to other objects and advantages of such self-supporting accessories for rung or extension ladders, it is an object of the present invention to provide an improved accessory wherein ladder twisting, wiggle, or sway is minimized or eliminated.

Another object of this invention is to provide a self-supporting accessory that will fold against the ladder for storage without detachment.

Another object of this invention is to provide a self-supporting accessory that will incorporate extra safety features in its basic construction and additionally enhance the safe use of the ladder.

Other objects and further advantages of this invention will become more apparent when the following description is taken in conjunction with the drawings, in which:

FIG. 1 is a perspective elevation view of an extension ladder supported by a preferred embodiment of this invention.

FIG. 2 is an enlarged fragmentary elevation view of the back of the ladder in the vicinity of the rung connection, showing the details thereof.

FIG. 3 is a cross-sectional view taken along line 3—3 in FIG. 2.

FIG. 4 is an enlarged view of the rung fitting (image plane of view parallel to plane of ladder).

FIG. 5 is a bottom view of the rung fitting, related to the view of FIG. 4.

Referring to FIG. 1, an extension ladder, consisting of lower section **10** and upper section **11**, is supported by means of legs **12** and **12'** through a common connecting fitting **13** which is removably attached to top rung **14** of lower ladder section **10**. J-hooks **15** extend down from fitting **13** and under next lower rung **16** to distribute

the load at the connection over two rungs (for safety purposse), and also to act as a moment arm against eccentric loading about rung **14**.

Legs **12** and **12'** are of fixed length, sized to suit, and form a tripod configuration with the lower ladder section **10** when in use supporting the ladder. Safety chain **17** extends around bottom rung **18**, out to snap-fastener **19** (hidden), on leg **12**, across to snap-fastener **19'** on legs **12'**, and back to bottom rung **18**. Snap-fastener **20** on one end of chain **17** permits the chain length to be adjusted so that it may accommodate various leg positions and set-ups with the ladder. Chain **17** serves to prevent legs **12** and **12'** from accidentally shifting position. Legs **12** and **12'** are also equipped with rubber feet **21**.

Referring to FIGS. 2, 3, 4, and 5, rung fitting **13** is secured to rung **14** by means of L-bolt **22** tightened by wing-nut **23**. Fitting **13** has a channel shape in cross-section for easy attachment to and removal from rungs of various sizes and shapes. J-hooks **15** are angularly disposed in fitting **13** and are anchored by means of jam nuts **24**.

Lugs **25** and **25'** have integral gear sectors **26** and **26'**, and pivot pins **27** and **27'** (respectively throughout). Pins **27** and **27'** are pivoted into rung fitting **13** on parallel centerlines, which are also parallel to the longitudinal axis of the ladder, and which are spaced such that gear sectors **26** and **26'** are in mesh.

Clevis fittings **28** and **28'** loacted at the tops of legs **12** and **12'** provide hinged leg connections to lugs **25** and **25'** by means of hinge pins **29** and **29'** which fit through mating holes **30** and **30'**. The centerlines of hinge pins **29** and **29'**, as determined by holes **30** and **30'**, lie in a plane perpendicular to the longitudinal axis of the ladder.

Spring pins **31** engage annular grooves **32** and **32'** of pivot pins **27** and **27'** to retain lugs **25** and **25'** in rung fitting **13**. Cotter pins **33** retain hinge pins **29** and **29'**.

The hinged motion of leg **12** about hinge pins **29** is free and independent of the hinged motion of leg **12'** about hinge pin **29'**. However, because of the meshing of gear sectors **26** and **26'**, the pivoted rotation of leg **12** about pivot pin **27** is in strict geared coordination with that of leg **12'** about pivot pin **27'**. If the ladder is held fixed, legs **12** and **12'** are thus free only to swing together or apart in opposite directions about pivot pins **27** and **27'**. Both legs cannot swing in the same direction simultaneously around the ladder axis. Conversely, if the legs are held fixed, the ladder is held against rotation.

Thus the mechanism described fulfills the desired function of holding the ladder so as to resist twisting, accomplishing a major object of this invention.

In order to provide that the legs may fold against the ladder for storage without detachment, holes **30** and **30'** for hinge pins **29** and **29'** may simply be offset from pivot pins **27** and **27'** by a spacing sufficient that no interference with rung **16** results when the legs are folded together and flat. J-hooks **15** act as a moment arm against eccentric loading about rung **14** resulting from this offset, as was explained earlier.

The preferred embodiment of this invention shown and described employs legs of fixed length. For adjustability of height, upper ladder section **11** may simply be raised or lowered to suit. In loading upper section **11** above rung **14**, care must be taken to insure that the load does not overhang beyond the boundaries of the base (roughly the triangle described by chain **17**), otherwise tipping will result.

Also, to insure that the ladder is not overstressed, the maximum cantilevered extension of upper section **11** beyond rung fitting **13** should not exceed one-fourth of the fully extended length of the ladder. Stresses in the ladder side rails when loaded at this cantilevered extension will

approximate the normal maximum stresses at full extension with the same load with the ladder leaned as in normal usage. When upper section **11** is limited to this maximum permissible extension, tipping due to overhung loads also is virtually impossible.

A rung fitting that provides geared leg coordination, such as disclosed in this application, may also be applied to an adjustable two-legged attachment such as described in my co-pending application, previously mentioned. When applied thereto, it would offer the same primary advantage of minimizing ladder twisting and would merely require the substitution of the geared rung connecting fitting of this invention or its functional equivalent.

Other variations of the principles disclosed may be applied in other embodiments of this invention. For example, it is not an absolute requirement that pivot pins **27** and **27'** be parallel to the longitudinal axis of the ladder. Neither is it entirely essential that hinge pins **29** and **29'** be in a plane perpendicular to the ladder axis. Other orientations of the hinges and pins are possible, as are other geared interconnections, such as bevel gears. The fitting **13** may be attached to rungs other than rungs **14** and **16**. Also, chain **17** is not absolutely necessary, for instance where spikes are employed at the lower ends of legs **12** and **12'** instead of rubber feet **21**.

Those skilled in the art will understand that such variations, and many other embodiments employing identical

or basically similar principles may be devised. It should therefore be understood that this invention is not limited to the specific construction shown and described except as so provided in the appended claim.

I claim:

A ladder supporting device comprising:

a fitting engageable in fixed alignment with said ladder;

fastening means for said fitting also engageable with said ladder;

two legs;

two terminals fastened to said fitting; offset portions on said terminals; gear teeth on said offset portions;

said terminals rotatable about fixed axes with respect to said fitting;

a geared interconnection between said terminals through said gear teeth;

hinges connecting said legs respectively and independently with said terminals.

References Cited by the Examiner

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