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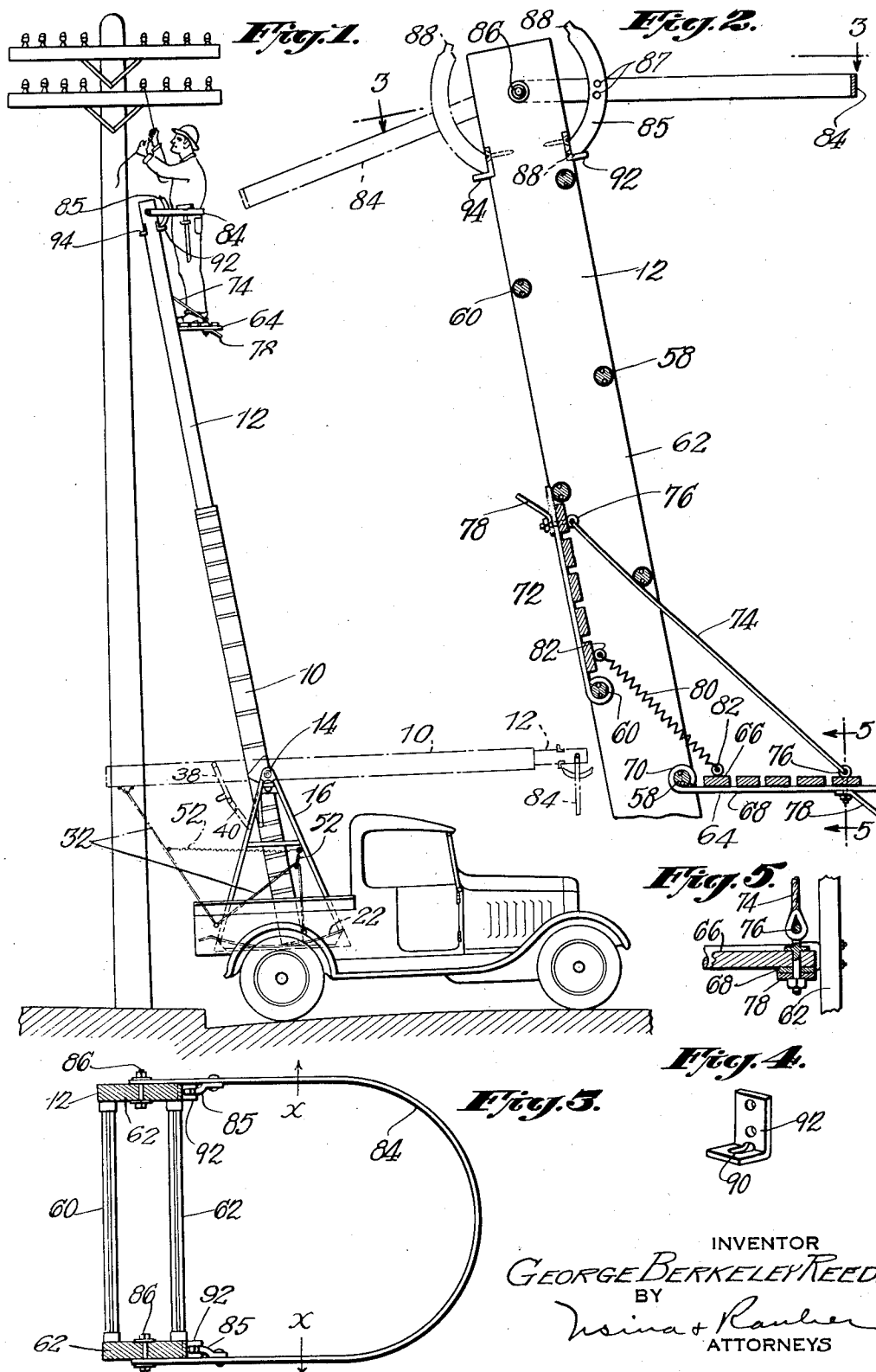
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1,921,583

LADDER CONSTRUCTION

Filed Oct. 12, 1931

2 Sheets-Sheet 1



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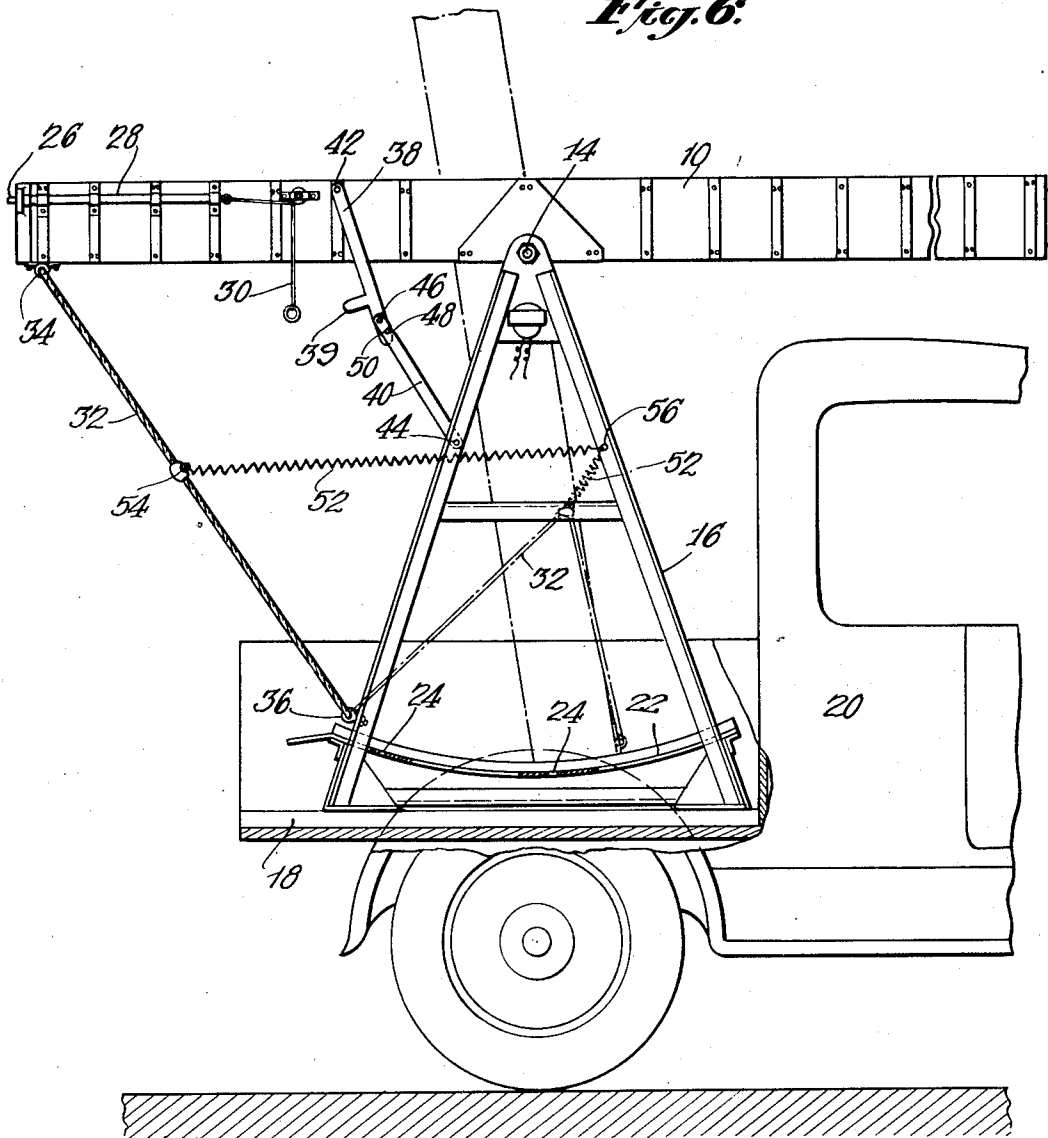
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Fig. 6.



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LADDER CONSTRUCTION

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7 Claims. (Cl. 228—6)

The invention relates to ladder construction and while not limited thereto is particularly adapted for use in connection with portable ladders such as those mounted on automobiles or similar vehicles. The invention aims to provide means for holding the ladder somewhat rigidly in a substantially horizontal position during transportation. Other features of the invention relate to the provision of wide steps carried by the rungs of the ladder and also to safety means which enable a workman to work freely with both hands without fear of losing his balance.

The above and other more detailed features of the invention will be fully apparent from the following specification when read in connection with the accompanying drawings and will be defined with particularity in the appended claims.

In the drawings:—

Fig. 1 is a side elevation showing in full lines an extension ladder in working position embodying my invention, the view also shows a ladder collapsed, in broken lines, in the position for transportation;

Fig. 2 is an enlarged detail view of the upper extension portion of the ladder;

Fig. 3 is a horizontal section on line 3—3 of Fig. 2;

Fig. 4 is a detail view of a notched bracket shown at the upper part of Fig. 2;

Fig. 5 is a detail view on line 5—5 of Fig. 2;

Fig. 6 is an enlarged view showing the supporting means for the ladder and illustrating the position of certain supporting parts when the ladder is in position for transportation.

Referring in detail to the drawings, the ladder of my invention as shown comprises a main section 10 and an extension section 12. The main section is pivotally mounted at 14 to an A-frame 16 fabricated of angle iron or similar rolled structural sections. The frame 16 is preferably secured to a base 18 carried by an automobile 20 of the type known as a light delivery truck.

The frame carries arcuate bars, one of which is shown at 22 in Fig. 6, which is provided with a plurality of holes 24 which are adapted to be engaged by a locking projection 26 formed on the end of a spring pressed rod which is slidable longitudinally within a casing 28 secured by suitable brackets to a side bar of the ladder. The locking projection can be connected or disconnected by exerting a pull on a flexible cord or cable 30.

Any suitable means not shown may be provided for moving the extension portion 12 relatively to the main portion 10 of the ladder. This

means is not shown as it forms no part of the present invention.

When the ladder is transported, it is preferably disposed in a horizontal position. For so holding the ladder in this position, I provide a cable 32, one end of which is secured to a fitting 34 fastened near the base end of the main ladder section 10. The other end of the cable is secured to an I-bolt 36 carried by the frame 16.

The pivotal support 14 of the main ladder being located off center with respect to the length thereof, it will be understood that the greater weight of the longer part thereof on one side of the pivot will tend to swing the long end downward. The cable 32 of course is of such length so as to normally hold the ladder in a substantially horizontal position as illustrated in dotted lines in Fig. 1 and full lines in Fig. 6. With such an arrangement, it will be understood therefore that the ladder is supported for transport by means extraneous or independent of the automobile structure. This is desirable for any auxiliary supports secured to the frame or body of the automobile are apt to move relatively to the frame. Such relative movement or swaying of the automobile frame relatively to the ladder supporting frame will cause annoying rattles or noises. Also if part of the ladder rests on a support carried by the frame a jogging causes wear on the ladder as well as the support.

The flexible cable which supports the ladder in transporting position is usually of stranded steel, or galvanized wire, or in some cases it may be made of copper cable to avoid rusting or deterioration by the elements; or ordinary heavy manila rope may be used, but, this is not so preferable on account of its shrinkage caused by wetting. Regardless of what kind of cable or rope is used, it is important to provide means for preventing the jogging of the ladder when in transit. For this purpose, I provide a toggle lock consisting of toggle links 38 and 40 pivoted, respectively, at 42 and 44 to the main ladder 10 and the A-frame 16. The links are pivotally connected at 46. The link 38 carries a pin 48 which is adapted to be seated in a notch 50 formed in link 40 when the toggle is thrown beyond dead center. The link 38 is provided with a handle 39 adapted to be grasped by the operator in order to break the toggle when it is desired to swing the ladder to the working position of Fig. 1. With the toggle thrown past dead center, as indicated in the position of Fig. 6, it will be understood that upward motion of the right end of the ladder is prevented because the pin

43 will be seated against the base of the notch 50 in link 40. On the other hand, the downward movement of the right end of the ladder is prevented by the cable 32. In order to compensate for any slack or eventual stretch in the cable 32, I provide a spring 52, one end of which is secured at 54, located at about midpoint of the length of the cable, the other end of the spring being secured at 56 to one of the members of the A-frame. This spring in addition to taking up any small amount of slack occasioned by stretch of the cable also serves as a take-up device for drawing the cable in under the frame when the ladder is swung to its working position, as indicated in full lines in Fig. 1 and dotted lines in Fig. 6.

Both the main ladder and the extension ladder section 12 are preferably provided with a double set of rungs. As illustrated in Fig. 2, the one set comprises the rungs 58 at one side and rungs 60 at the other side of the side rail 62. The rungs 58 and 60 are preferably arranged in staggered relationship as clearly indicated in Fig. 2. With such an arrangement, it will be understood that the workman may climb the ladder on either set of rungs.

One working at or near the top of a long ladder is apt to become soon fatigued if obliged to support his entire weight merely on the rung. Also if he is obliged to reach upwardly or outwardly from the ladder he is usually obliged to use one hand to steady himself so as not to lose balance.

To provide greater comfort for the workman and to insure his safety, I provide steps supported on the opposite sets of rungs near the top of the ladder and also safety means as shown in Fig. 2. The relatively wide step 64 shown at the right at the lower side of Fig. 2 includes a plurality of slats 66 which are riveted or otherwise secured to side bars, one of which is shown at 68. This side bar is bent around at one extremity as indicated at 70 so as to pivotally support the step, on one of the rungs 58. There is another step of substantially the same construction as indicated at 72, this step being pivoted on one of the rungs 60 as illustrated. The steps 64 and 72 are connected with one another by supporting cables, one of which is shown at 74. Each cable 74 engages an I-bolt 76 secured to the outer end of the respective steps. Each I-bolt also serves to fasten a kick plate 78 to the step. Normally a spring 80 secured to the two bolts 82 carried by the steps 64 and 72 tends to hold both steps folded in against the corresponding rungs of the ladder.

When the workman climbs the ladder and reaches a point near the top, he merely has to engage his toe with the kick plate 78 so as to swing the step into position. He usually first climbs to a point above the step, then presses the same downwardly by engagement with the kick plate. He may then stand upon the wide step, as indicated in Fig. 1 and thus have a comfortable support while performing his task near the top of a ladder.

In order that the workman may be free to use both hands without thought of steadying himself against falling, I provide a safety bail. This includes a relatively stiff or rigid substantially U-shaped bar as indicated at 84. This is pivoted on suitable trunnion bolts 86 located near the upper extremity of the ladder. The pivot point is so located that the safety bail can be swung into operative position at opposite sides of the

ladder as indicated by full and dotted lines in Fig. 2.

This safety bail being of relatively stiff or rigid material provides means whereby the workman can be braced while leaning sidewise from the ladder. For bracing or rigidifying the bale against sidewise strain, for example, against strain in the direction of the arrows, in Fig. 3, I provide rigidifying members 85 secured by rivets or other suitable fastening devices 87. Each rigidifying member has prongs 88 formed at the two extremities thereof which are adapted to alternatively engage respective notches 90 formed in brackets 92 and 94 secured to the side rails of the ladder.

When the prongs 88 interengage with the notches of the brackets, it will be understood that the bail will be adequately braced so as to enable the workman to lean sidewise against the bail in the direction of the arrow x . And, when such strain is applied on the bail, rigidifying members will prevent the bail from bending outwardly about the pivotal point 86. This arrangement, it will be understood, ensures safety of the workman to freely perform his task without fear of losing balance.

While I have described with great particularity certain specific constructions of the embodiment of the invention herein illustrated, it is not to be construed that I am limited thereto since various modifications may be made by those skilled in the art without departing from the invention as defined in the appended claims.

What I claim is:

1. A ladder having a stiff safety bail pivoted thereto, a rigidifying member secured to and movable with the bail and an apertured member secured to the ladder for interlocking engagement with said rigidifying member.

2. A ladder having a bail of stiff material pivotally secured near the upper extremity thereof, a rigidifying member secured to said bail, notched brackets on opposite sides of the ladder, said rigidifying member having separate prongs adapted for interlocking engagement with either of said notched brackets.

3. A ladder having a double set of rungs, respective wide steps pivoted on staggered rungs, means tending to collapse said steps against certain of the rungs and a member connecting said steps whereby part of the load of a step carried by one set of rungs can be transmitted through said member to the step carried by the other set of rungs.

4. The device of claim 3 wherein the steps have respective kick plates for swinging either step of the rung into supporting position, said kick plates being secured to the steps at points spaced from the rungs which pivotally support said steps.

5. A portable ladder supporting apparatus comprising a frame adapted to be secured to a vehicle, a ladder pivotally mounted on said frame, a cable adapted to limit the movement of the ladder in one direction about its pivotal support so as to position the ladder when in transit, and a toggle joint between the ladder and said supporting frame adapted to releasably lock the ladder in a predetermined position during transit, said toggle joint including two pivotally connected members and being provided with means to limit the relative movement of said members a predetermined distance past dead center in order to hold the cable tensioned.

6. A portable ladder supporting apparatus comprising a frame adapted to be secured to a

vehicle, a ladder pivotally mounted on said frame at a point between the ends of the ladder, a cable having one end secured to the frame and another end secured near one extremity of the ladder and a toggle joint including two pivotally connected members connecting the ladder with said frame, said toggle joint being provided with means to limit the relative movement of its members a predetermined distance past dead center in order to hold the cable tensioned.

7. A portable ladder supporting apparatus comprising a frame adapted to be secured to a vehicle, a ladder pivotally mounted on said frame, a cable connected at one end to said frame and at the other end to said ladder, said cable being adapted to limit the ladder when in its inoperative position, spring means adapted to take-up the slack in said cable when the ladder is swung into working position, and means for releasably locking the ladder in working position.

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