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A. ROSENBERG

AERIAL FIRE LADDER

Filed August 15, 1925 2 Sheets-Sheet 1

Fig. 1.

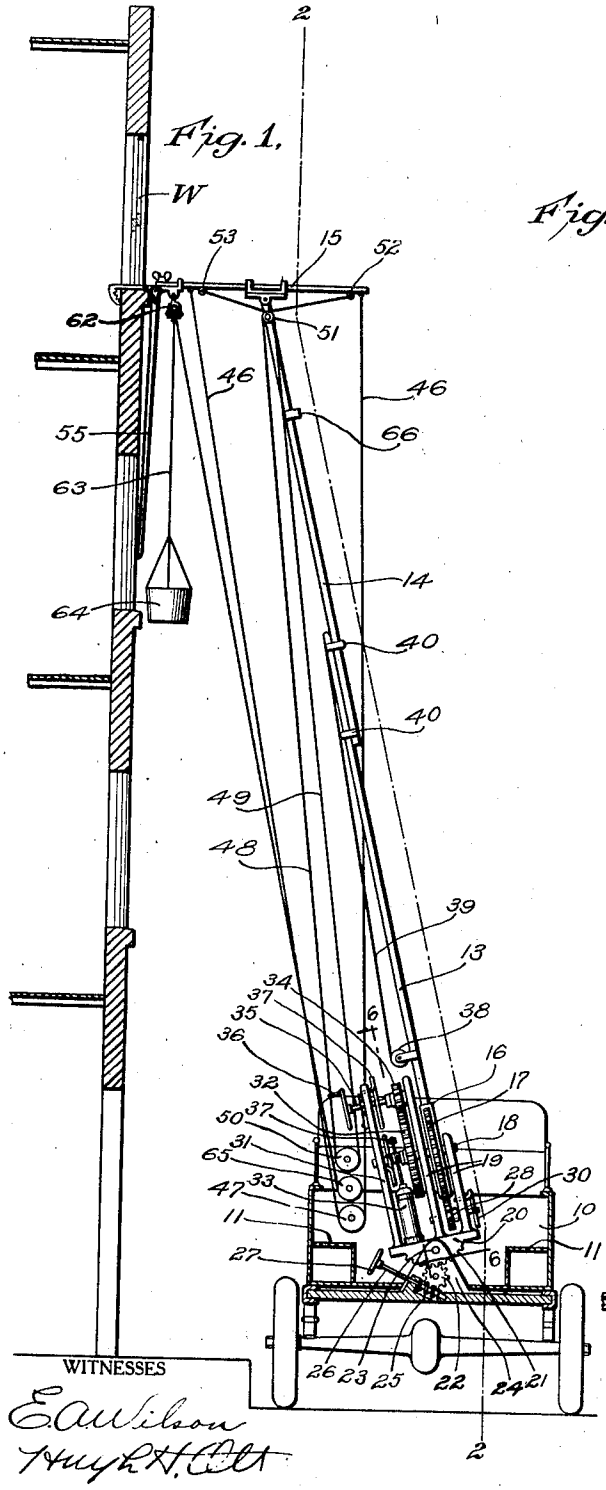
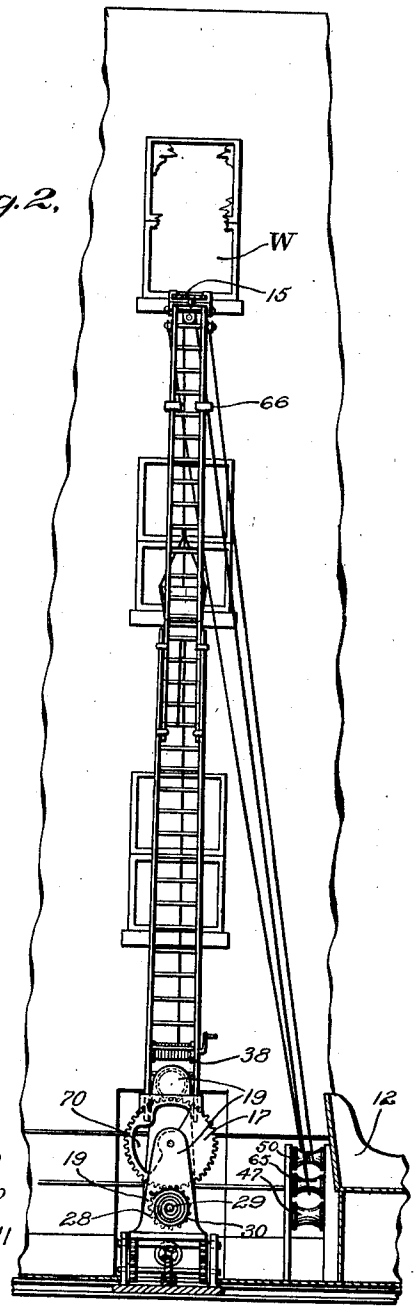


Fig. 2.



WITNESSES

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Fig. 3.

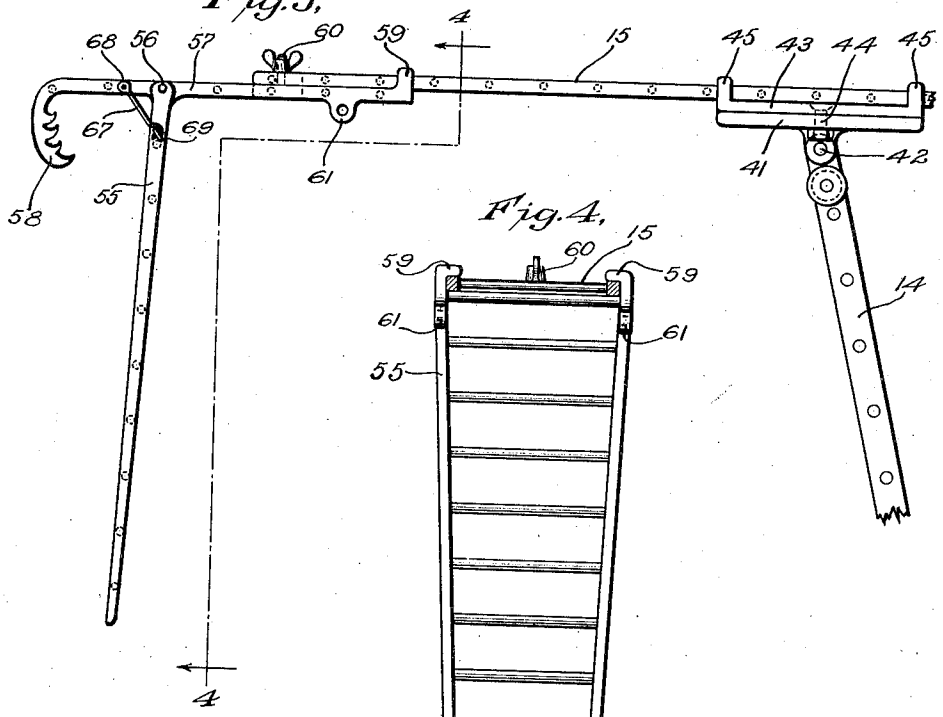


Fig. 4.

Fig. 5.

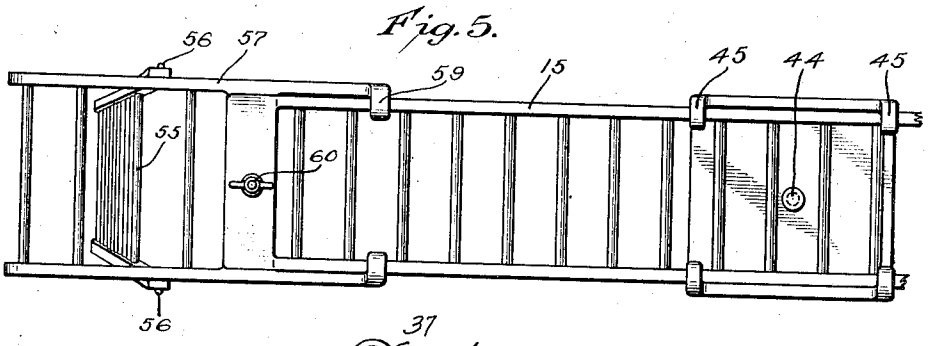
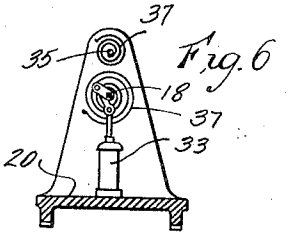


Fig. 6



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UNITED STATES PATENT OFFICE.

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AERIAL FIRE LADDER.

Application filed August 15, 1925. Serial No. 50,470.

This invention relates to fire-fighting apparatus, and has particular reference to an improvement in an aerial fire ladder.

The invention comprehends for its principal object an improved means for mounting an aerial fire ladder upon a truck and mechanism for effecting the raising and lowering of the same whereby the raising and lowering operations may be accomplished more expeditiously and with a minimum of effort.

More specifically the invention contemplates an aerial fire ladder and means for mounting the same upon a fire truck with the width of the ladder disposed vertically when lowered so that in raising the ladder the same is disposed edgewise to its path of movement to afford a minimum air resistance, and, at the same time, to dispose the same in proper scaling position without having to turn the ladder when the truck is arranged alongside the building.

The invention furthermore comprehends an aerial fire ladder mounting which is laterally rockable for attaining the desired inclination of the ladder with respect to a building when the device is arranged alongside thereof.

As a further object the invention embodies an aerial extension fire ladder including any desired number of relatively movable sections and including means carried by the upper end of the uppermost section for breaking through a window and engaging behind the inner portion of the sill to establish a rigid connection of the ladder with the building.

The invention aims as a further object to provide a detachable scaling ladder section carried by the means at the upper end of the extension ladder whereby ascent and descent between superposed floors may be had.

The invention aims as another object to provide a portable elevator device carried by the scaling ladder section for lowering occupants of a burning building from the various stories and for raising firemen thereto.

The invention furthermore resides in the provision of a ladder-raising and lowering mechanism for effectually and expeditiously accomplishing the raising and lowering operations.

As a still further object the invention comprehends an aerial fire ladder mounting which relatively positions the ladder in a manner to occupy a minimum amount of space on the truck, to afford more room for the carrying of firemen, as well as to afford a clearance for the rear pilot mechanism and operator.

With the above recited and other objects in view, reference is had to the following specification and accompanying drawings in which there is exhibited one example or embodiment of the invention which is in no way intended as a limitation upon the scope of the appended claims as it is to be clearly understood that variations and modifications which properly fall within the scope of said claims may be resorted to when found expedient.

In the drawings—

Figure 1 is a transverse sectional view through a truck equipped with an aerial fire ladder constructed in accordance with the invention and illustrating the same in active use;

Fig. 2 is a longitudinal sectional view through the truck, taken approximately on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary side view of the upper end of the ladder;

Fig. 4 is a sectional view taken approximately on the line 4—4 of Fig. 3;

Fig. 5 is a plan view of the upper end of the ladder as illustrated in Fig. 3;

Fig. 6 is a transverse sectional view taken approximately on the line 6—6 of Fig. 1.

Referring to the drawings by characters of reference, 10 designates a fire truck which is preferably provided with longitudinally extending seats 11 in the body portion, extending from the driver's seat 12 to the rear of the truck.

The aerial ladder includes a lower section 13 and an intermediate relatively slidable section 14 having connected with its upper end a swingable and slidable section 15. The lower section 13 is stepped in a yoke 16 on a gear 17, which is mounted and secured to a shaft 18 journaled in the standards 19 of a laterally rockable frame 20, the said frame 20 having a gear segment 21 with which a pinion 22 meshes. The frame 20 is fulcrumed as at 23 in a bearing bracket 24 and the pinion 22 is journaled in said bearing bracket and meshes with a worm 25 on a worm shaft 26 having a manipulating wheel 27. A driving pinion 28

meshes with the gear 17 and the shaft 29 of said pinion is connected at one end to a spiral spring 30, the opposite end of which is secured to the outer standard 19 for a purpose to be hereinafter set forth. The frame 20 is further provided with a standard 31, between which and the central standard 19, a gear 32 is arranged, which is keyed to the shaft 18. An air pump or motor 33 is operatively connected to a crank portion of the shaft 18 for turning the shaft. A pinion 34 meshing with the gear 32, is connected to a shaft 35 upon which a manually operating wheel 36 is secured for turning the shaft 18 in an emergency in event of failure of the air motor 33 to operate. The shafts 18 and 35 each have secured thereto one end of a spiral spring 37, the opposite end of which is secured to the bearing standard 31, and said springs together with the spring 30, function to tend to substantially counterbalance the weight of the ladder due to the fact that said springs are wound up by the weight and leverage of the ladder when the same is lowered, so that the springs are put under tension when the ladder is in lowered position and constitute auxiliary raising means therefor. A drum 38 is mounted on the lower ladder section 13 and has one end of a hoisting cable 39 wound thereupon, the opposite end of which is trained over the upper rung of the lower section 13 and is attached to the lower rung of the section 14. The sections 13 and 14 are slidably associated in the usual manner by connecting guide cleats 40.

The swingable and slidable ladder section 15 is connected to the upper end of the ladder by a substantially universal joint, which consists of a section 41 pivoted as at 42 to the upper extremity of the section 14, and a section 43 which overlies the same and is swivelled as at 44 to the section 41. The ladder section 15 is slidable in hooked lugs 45 of the section 43 which hooked lugs embrace the side rails of the ladder section 15. The outer and inner ends of the ladder section 15 have respectively connected thereto, the opposite ends of a cable 46 which is trained around a winch 47, the turning of which in opposite directions effects the rocking of the ladder section 15 on the pivot or fulcrum 42. In order to provide means for sliding the ladder section 15 in the universal joint section 43, the opposite leads 48 and 49 of the cable trained around a winch 50, and a guide pulley 51, are connected as at 52 and 53 to the opposite ends of the ladder section 15.

A scaling ladder 55 is pivoted, as at 56, at its upper end to the shank 57 of a grappling hook 58. The outer end of the grappling hook shank is provided with hooked lugs 59 embracing the side rails of the ladder section 15 for slidably associating said elements and a bolt 60 detachably connects and retains the shank 57 in associated relation with the ladder section 15. The shank is further provided with an eyelet 61 for supporting a pulley block 62, around which an elevator cable 63 is trained, the elevator cable supporting at one end a cage or car 64 and having its opposite end trained around a winch 65 to afford means for lowering trapped occupants of a burning building from the various floors and means for raising firemen.

In use and operation, the ladder sections 13 and 14 are normally contracted, collapsed or telescoped, to reduce their length, and the frame 20 is rocked to a horizontal position so that the contracted ladder sections when lowered are disposed centrally within the truck body 10 with the width of the ladder disposed vertically. The ladder section 15 is also swung to a position parallel to the ladder section 14 and is collapsed or telescoped to dispose the side rails in engagement within the embracing cleats 66. The scaling ladder in this position is swung alongside of and substantially parallel to the ladder sections 13, 14 and 15.

When the truck is stopped alongside of a burning building, the ladder is simultaneously raised or extended while the frame 20 is rocked laterally to the desired inclination. The ladder section 15 is slid upwardly and swung by drawing on the lead of the cable 46 attached to its inner end, so that the grappling hook breaks through the window sash of the window W and engages behind the inner part of the sill. Hooks or equivalent fastening devices 67 are pivoted as at 68 to the shank 57 and are engageable with keepers 69 on the scaling ladder 55 for the purpose of holding said ladder at an inwardly and downwardly inclined relation to the wall of the building. At the same time, the positioning of the grappling hook into engagement with the window sill effects the disposal of the elevator in a proper position for use. After firemen have ascended the ladder sections 13 and 14 and either entered the window W or reached the scaling ladder 55, the ladder section 15 may be detached from the scaling ladder by means of the bolt 60, so that the ladder section 15 may be elevated or lowered to dispose the same in proximity to other windows of the building. It will be noted that the gear 17 is cut away at 70 to lighten one side of the keeper gear so that the opposite side constitutes a weight which combined with the springs 30 and 37, sets up a counterbalancing action.

From the foregoing it will thus be seen that the improved construction and mode of mounting an aerial fire ladder substantially increases to a maximum, the speed with which the parts may be put into active use, and minimizes the amount of air resistance

against the raising of the ladder and the power required to operate the same.

What is claimed is:

1. Aerial fire ladder apparatus embodying a wheeled vehicle, an aerial ladder pivoted to the vehicle, a gear secured to the ladder coaxially of the pivot of the ladder, a segmental portion of said gear being weighted to at least partially counterbalance the weight of the ladder, a pinion meshing with said gear, an operating shaft for the pinion, and a spiral spring coiled about said shaft, one end of the spring being secured to the shaft and its other end being secured to a fixed support and the spring being tensioned to assist the weighted gear in counterbalancing the ladder.

2. Aerial fire ladder apparatus embodying a wheeled vehicle, a ladder supporting shaft mounted on the vehicle, a ladder secured at one end to the shaft, a counter shaft geared to the ladder supporting shaft, a weight coacting with the ladder shaft for at least partially counterbalancing the ladder, and a spring coacting with the counter shaft for assisting the weight in its counterbalancing function.

3. Aerial fire ladder apparatus embodying a wheeled vehicle, an aerial ladder pivotally supported thereon, means for elevating the ladder into upstanding position; a rockable ladder section pivotally and slidably mounted on the upstanding portion of the ladder, and means, for tilting and longitudinally sliding said section with respect to the upstanding portion of the ladder.

4. Aerial fire ladder apparatus embodying a wheeled vehicle, a main ladder portion mounted on the vehicle, means for elevating said main ladder portion into substantially upstanding position, a guide member tiltably mounted on the main ladder portion, a rockable ladder section carried by the guide member and mounted for longitudinal movement therein, and means for tilting said section and for longitudinally shifting it in the guide.

5. Aerial fire ladder apparatus embodying a wheeled vehicle, a main ladder portion mounted on the vehicle, means for elevating said main ladder portion into substantially upstanding position, a guide member pivotally mounted at the top of the main ladder portion for both tilting and rotary movement, and a ladder section carried by and longitudinally movable in said guide member.

6. Aerial fire ladder apparatus embodying a wheeled vehicle, a main ladder portion mounted on the vehicle, means for elevating said main ladder portion into substantially upstanding position, a guide member pivotally mounted at the top of the main ladder portion for both tilting and rotary movement, a ladder section carried by and longitudinally movable in said guide member, and means operable from the ground for manipulating said section.

7. In an aerial fire ladder apparatus, a main ladder embodying a plurality of extensible sections, means for mounting the main ladder on a vehicle, means for moving the main ladder into and out of cooperative relation to a building, and a supplementary ladder section mounted on the main ladder for pivotal and rocking movement, with respect to the main ladder, on different axes.

8. Aerial fire ladder apparatus embodying a wheeled vehicle, a ladder supporting shaft mounted on the vehicle, a ladder secured at one end to the shaft, a counter shaft geared to the ladder supporting shaft, a weight coacting with the ladder shaft for at least partially counterbalancing the ladder, a spring coacting with the counter shaft for assisting the weight in its counterbalancing function, a crank on the ladder shaft, and a fluid operated piston for operating said crank to raise or lower the ladder.

9. In an aerial fire ladder, means for mounting the same on a vehicle with the width of the ladder disposed vertically when lowered, said ladder including extensible sections and a rockable and swingable upper section, in combination with a scaling ladder, and detachable means of connection between said rockable section and the scaling ladder whereby the scaling ladder may be positioned and associated with a window frame and disconnected from the rockable section, as an for the purpose specified.

10. In an aerial fire ladder, means for mounting the same on a vehicle with the width of the ladder disposed vertically when lowered, said ladder including extensible sections and a rockable and swingable upper section, in combination with a scaling ladder, detachable means of connection between said rockable section and the scaling ladder whereby the scaling ladder may be positioned and associated with a window frame and disconnected from the rockable section, and an elevator apparatus supported by and vertically movable with respect to the scaling ladder section.

11. In an aerial fire ladder apparatus, a main ladder embodying a plurality of extensible sections, means for mounting the main ladder on a vehicle, means for moving the main ladder into and out of cooperative relation to a building, and a supplementary ladder section mounted intermediate its ends upon the main ladder for rockable movement on a substantially horizontal axis and for pivotal movement on a substantially vertical axis, while the main ladder remains in stationary, upstanding position.

12. In an aerial fire ladder apparatus, a main ladder embodying a plurality of extensible sections, means for mounting the main

ladder on a vehicle, means for moving the main ladder into and out of cooperative relation to a building, a guide member supported at the free end of the main ladder for tilting movement on a horizontal axis and also for rotary movement on a substantially vertical axis, while the main ladder is in stationary, upstanding position, and a supplementary ladder section carried by and longitudinally slidable in said guide member.

13. In an aerial fire ladder apparatus, a main ladder, means for mounting the ladder on a vehicle, means for moving the ladder into and out of cooperative relation to a building, and an entrance and exit member mounted at the free end of the main ladder for pivotal movement on a horizontal axis, and for longitudinal sliding movement, whereby said member may be moved into substantially horizontal position while the main ladder is upright and then longitudinally moved into cooperative relation with the window of the building to permit persons to reach the building from the top of the main ladder and vice versa.

14. In an aerial fire ladder apparatus, a main ladder, means for mounting the ladder on a vehicle, means for moving the ladder into and out of cooperative relation to a building, and an entrance and exit member mounted at the free end of the main ladder for pivotal movement on a horizontal axis, for lateral movement on a vertical axis and for longitudinal sliding movement, whereby said member may be moved into substantially horizontal position while the main ladder is upright and then longitudinally moved with desired lateral pivotal adjustment into cooperative relation with the window of the building to permit persons to reach the building from the top of the main ladder and vice versa.

15. In an aerial fire ladder apparatus, a main ladder, means for mounting the same on a vehicle, means for moving the main ladder into and out of cooperative relation with a building, a rockable and swingable section pivoted to the free end of the main ladder and adapted to extend from the top of the main ladder to a window of the building, in combination with a scaling ladder pivoted to said section, and means for securing the scaling ladder against pivotal movement with respect to said section.

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