

No. 736,104.

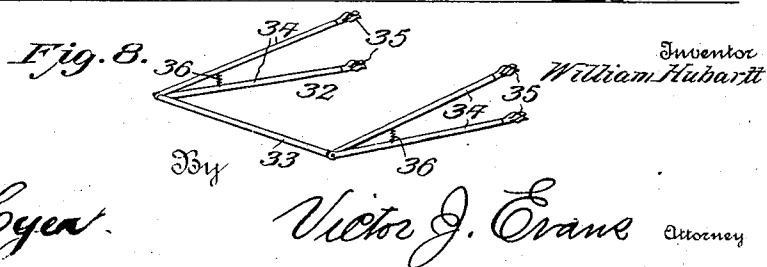
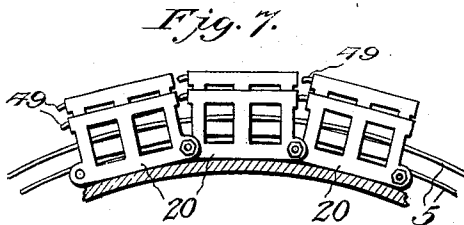
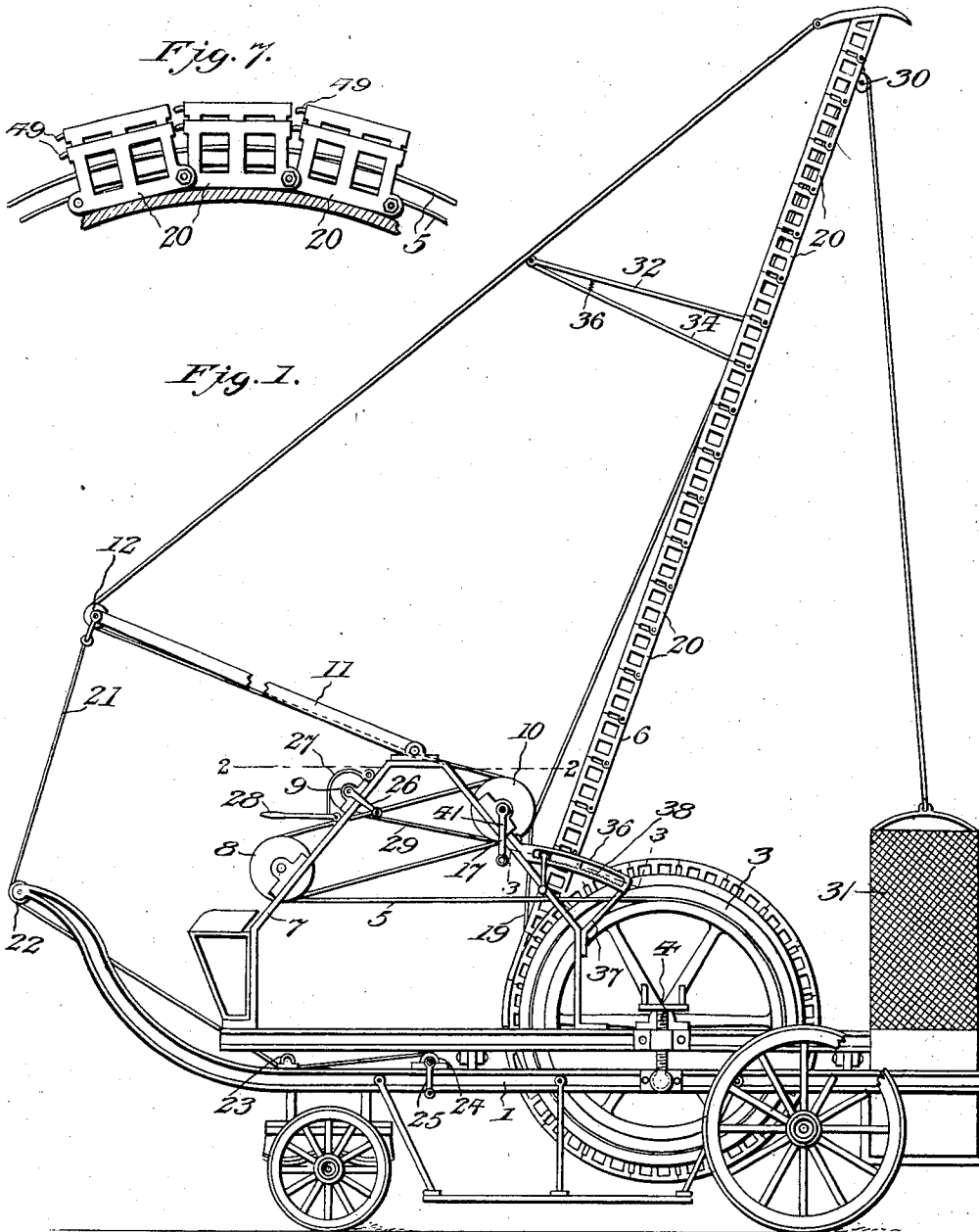
PATENTED AUG. 11, 1903.

W. HUBARTT.
COMBINED FIRE LADDER AND ESCAPE MEANS.

APPLICATION FILED SEPT. 13, 1902.

NO MODEL

2 SHEETS—SHEET 1.



Witnesses

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2 SHEETS-SHEET 2.

Fig. 2.

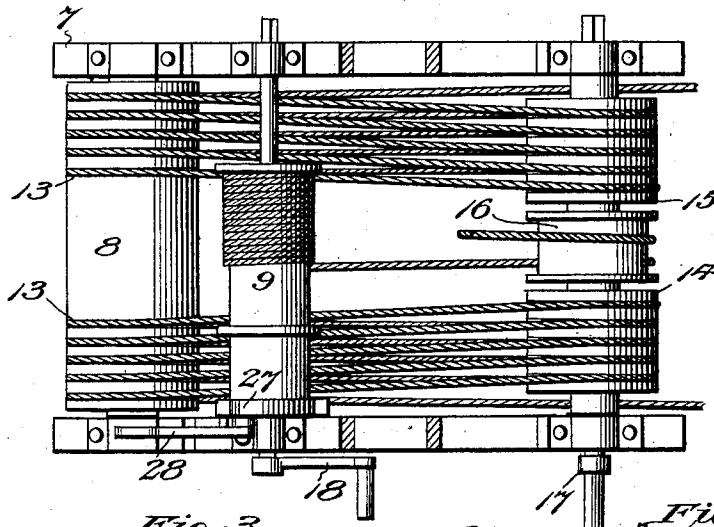


Fig. 3.



Fig. 4.

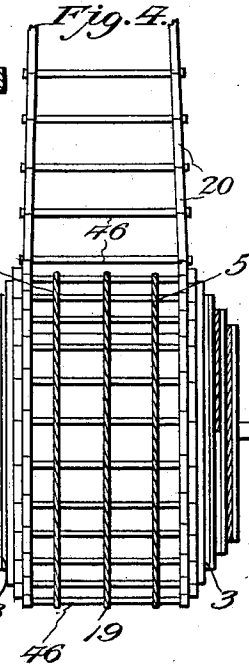


Fig. 5.

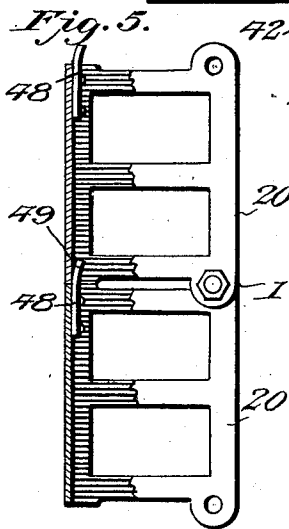


Fig. 6.

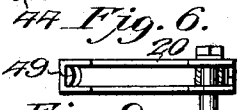
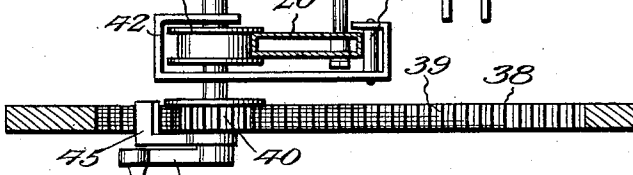
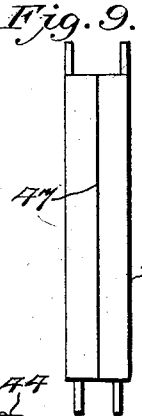


Fig. 9.

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WILLIAM HUBARTT, OF PLAINFIELD, NEW JERSEY.

COMBINED FIRE LADDER AND ESCAPE MEANS.

SPECIFICATION forming part of Letters Patent No. 736,104, dated August 11, 1903.

Application filed September 13, 1902. Serial No. 123,318. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HUBARTT, a citizen of the United States, residing at Plainfield, in the county of Union and State of New Jersey, have invented new and useful Improvements in a Combined Fire Ladder and Escape Means, of which the following is a specification.

This invention relates to fire-ladders and fire-escapes of that class which are carried by a wheeled vehicle for ready transportation from one place to another; and the objects of the same are to produce a novel form of jointed ladder adapted to be reduced to compact form when not in use by reeling the same and embodying structural features whereby it will be prevented from buckling or sagging at any point; to provide brace devices which are readily applicable to the ladder as projected upwardly at regular intervals and co-operating with the elevating-cable or analogous device to establish a rigid structure without interfering with the ascent or descent of firemen or other persons over the ladder; to reinforce or brace the ladder adjacent to the reel from which the same is projected and to have adjustable means at such point to accommodate the angle of inclination of the ladder and the position thereof in relation to the reel, which is variable in view of the winding and unwinding thereof on and from the reel, and to provide a simple and effective organization of elements for regulating the angle of inclination of the ladder when projected and the tension on the elevating means.

The invention consists, essentially, of improvements on the patent granted to me July 22, 1890, No. 432,877, which will be more fully hereinafter described and claimed.

In the drawings, Figure 1 is a side elevation of a fire escape and ladder embodying the features of the invention. Fig. 2 is a horizontal section on the line 2 2, Fig. 1. Fig. 3 is an enlarged section on the line 3 3, Fig. 1. Fig. 4 is an end view of the reel upon which the ladder and the raising rope or cables are wound. Fig. 5 is an enlarged sectional elevation of a portion of the ladder. Fig. 6 is a detail sectional plan view of a part of the ladder. Fig. 7 is a longitudinal section through a part of the reel and showing

a portion of the ladder in elevation thereon to illustrate the mode of winding the ladder and the raising cables or ropes. Fig. 8 is a perspective view of the bracing means for the ladder. Fig. 9 is a rear edge elevation of one of the links or sections of which the ladder is made up.

Similar numerals of reference are employed to indicate corresponding parts in the several views.

The numeral 1 represents a suitable truck which is mounted on wheels and adapted to be drawn as any ordinary fire-engine or other analogous machine. Journaled on the top of the truck is a shaft 2, to which the reel 3 is rigidly secured. One of the boxes of the shaft 2 is secured to the upper end of a vertical screw 4, disposed upon one side of the truck, so that in the event that the machine be stopped upon any uneven place the screw can be operated to raise or lower the box to which it is connected, and thereby adjust the reel so as to cause it to stand perfectly level. As clearly illustrated by Fig. 4, each end of the reel is made conical and provided with a spiral groove, and in the spiral groove is wound the rope or cable 5 at opposite sides of the reel and by means of which the ladder is raised or elevated into operative position and its descent regulated at will. The ladder 6 is also constructed to wind upon the reel or unwind from the latter as the elevating ropes or cables are correspondingly operated, and simultaneously with this winding and unwinding operation of the ladder the said ropes or cables similarly operate in relation to the reel. When the ladder 6 begins to rise or is elevated from the reel, the ropes or cables 5 begin to wind upon the spiral grooves at the ends of the reel, and when the ladder is raised to its full extent the ropes or cables are wrapped entirely upon the conical grooved ends of the reel. As the ladder is lowered and again wrapped upon the reel the ropes unwind from the conically-grooved ends of the latter in proportion to the rapidity in which the ladder is wound upon the reel. By this construction the ropes are wound upon and unwound from the reel in proportion as the size of the reel increases or decreases.

On the forward portion of the truck-frame

are oppositely-disposed arch-frames 7, which will be suitably tied or transversely connected, and on the front thereof a single drum 8 is rotatably mounted, and above the latter is an elevating-drum 9. On the rear portion of the connected frames 7 is an actuating-drum 10, and on the top of the said frames at the center the inner end of a boom 11 is pivoted and has a sheave or pulley 12 in its outer free end. The drum 8 at its opposite extremities is formed with a series of spiral grooves 13, and similar grooves 14 are formed in the opposite end portions of the actuating-drum 10, the center of the latter being cut away, as at 15, to receive a loose drum or pulley 16, all as clearly shown by Fig. 2. The drum 8 serves as a compensating idler, and the drum 10 has its shaft extended to receive a crank-handle 17, whereby it may be actuated. The elevating-drum 9 also has its shaft projected to receive crank-handles 18, it being understood that either of the drums 9 and 10 may be operated by one or two crank-handles at opposite sides of the machine and controlled by a similar number of operators. The ropes or cables 5 extend from the spiral grooves at the opposite ends of the reel to and engage the spiral grooves at the opposite extremities of the drum 8 and from the latter extend over to the drum 10, engaging the grooves 14, adjacent to the opposite ends of this actuating-drum, and by this means the said ropes or cables are gradually moved inwardly toward the center of the drum 10, and the two extremities are connected to the lower terminal or inner end of the ladder on the reel and are adapted to wind with the ladder on the reel and also to proportionately unwind when the ladder is elevated. It will therefore be seen that the ropes or cables 5 serve to elevate or unwind the ladder as well as wind the same and are taken up or given out equally with the winding and unwinding movements of the ladder through the medium of the spirals at the opposite ends of the reel. It will be seen that the drums 8 and 10 in addition to their operation of drawing the ropes or cables 5 to the center or within the opposite ends of the reel also serve to maintain the said ropes or cables in a practical taut condition to render them effective in controlling the movements in opposite directions of the ladder in relation to the reel. The foot or lower end of the ladder has a rope or cable 19 secured thereto, the said rope or cable passing upwardly over the inner portions of the loose drum or pulley 16 and then under the boom 11 and upwardly over the pulley 12 to the upper end of the ladder 6, where it is secured. This rope or cable 19 serves to keep the parts of the ladder in firm engagement with each other and prevent buckling or bending of the ladder structure as a whole and adapts the ladder to sustain considerable weight. The rope or cable 19 winds and unwinds equally in relation to the ladder on and from the reel—that is, as the ladder is rapidly elevated or lowered by wind-

ing the rope or cable 19 is proportionately paid out or wound on the reel with the ladder without modifying the desired tautness thereof, owing the operation of the boom and its constant bearing position in relation to said cable 19.

The ladder 6 is made up of a series of links or sections 20, which will be presently described in detail, and said sections are joined at their rear upper and lower corners or ends, so that when the ladder is brought down over the reel in the winding operation the several sections or links will break or separate toward the reel to adapt them to assume a circular alinement and the rope or cable 19 pulls in a direction on the ladder opposite that in which they break or separate when wound, and thereby the several sections or links 20 are caused to have their side terminals closely brought together. As in my patent aforesaid, the several sections or links 20 gradually increase in width from the upper smallest link or section to the lowermost one of the series, so that when the ladder is wound upon the reel the several sections will fold into each other to produce a compact arrangement, as clearly shown by Fig. 4.

It is obvious that it will be necessary to vary the inclination of the projected ladder, and for this purpose the upper end of a rope or cable 21 is attached to the outer free end of the boom 11 and passes over guide-pulleys 22 and 23 on different parts of the frame of the truck and finally engages the winding-drum 24, having bearing on said frame in rear of the pulley 23 and provided with a crank-handle 25. By actuating the drum 24 in opposite directions the ladder may be moved nearer to or farther from a true vertical position, and it will be understood that the drum 24 will be supplied with suitable well-known means, such as a ratchet and pawl or other device, for checking its operation when it is desired to maintain the ladder in a precise adjusted position or inclination.

It will be observed in the present improved construction that the elevator-drum 9 is wholly independent of the drums 8 and 10, and connected to the shaft thereof is an operating crank-handle 26, whereby it may be rotated, and to control its movement a brake-band 27 is employed and attached to an operating-lever 28, fulcrumed on the one-arch frame 7 in a position convenient to the operator. The drum 9 is engaged by an elevator-cable 29, which passes under and bears against the loose drum or pulley 16 and then upwardly over the ladder and through a pulley 30, secured to the upper ends of the ladder at the rear side, and from said pulley 30 the cable continues downwardly and is attached to the upper end of an elevator 31 of suitable construction, which is normally carried in a seat provided therefor at the rear of the truck-frame. This elevator 31 may be raised or lowered at will and used for rescuing persons from different parts of a burning

building, it being proposed to equip the same with such means that it can be readily entered with safety.

As an additional safeguard in maintaining the ladder in rigid condition when projected or elevated detachable braces 32 are employed and comprise outer bearing-bars 33, having arms 34 pivoted to the opposite ends thereof, the arms being provided at their inner terminals with spring-clips 35 to spring over the rounds of the ladder. This form of brace is clearly shown in Fig. 8, and the arms 34 thereof are normally held in close relation by interposed springs 36; but when the brace is applied the arms are pulled apart to engage the ladder-rounds. Each brace is open, so that firemen or other persons ascending and descending the ladder may readily pass therethrough, and as the ladder is projected or elevated these braces will be applied at intervals and serve as a further means to prevent the said ladder from buckling or bending from the weight imposed thereon. The bearing-bars 33 of the braces 32 are engaged by the cable 19, as clearly shown by Fig. 1, and a truss is thus virtually formed at regular intervals with obvious strength and institution of rigidity.

The improved structure also includes a combined guide and brace close to the reel, and consists of opposite segmental supports 36, held on the rear portions of the arch-frames 7 and sustained in immovable position by rear downwardly-extending braces 37, connected to said frame. The supports 36 are longitudinally slotted, as at 38, and the lower walls of the slot are formed with rack-teeth 39. The supports 36 are spaced transversely such a distance as to permit the widest ladder section or link to readily pass between the same to and from the reel, and cooperating with the said supports and located in advance of the reel is a guiding mechanism comprising a shaft 39^a, having pinions 40 keyed fast thereto and engaging the rack-teeth 39, and at one end the said shaft has a crank-handle 41, by which it and the pinions are operated. Slidingly mounted on the shaft 39^a are guide-frames 42, having opposite angularly-bent extremities, the one extremity of each frame 42 almost wholly surrounding a grooved guide-pulley 43 on the said shaft, the grooves in the said pulleys being slightly greater than the width of the links or sections 20 of the ladder. The opposite angular extremity of each guide-frame 42 has an antifrictional roller 44 mounted therein, and between the grooved pulleys 43 and the rollers 44 the links or sections 20 of the ladder have free movement, as clearly shown by Fig. 3. The grooved pulleys 43 also freely slide on the shaft 39^a to accommodate the gradual increase of the links or sections 20 of the ladder as they are unwound from the rear so far as width or transverse extent of the same is concerned or decrease in the transverse extent of said links or sections when the ladder is wound upon the reel, and thereby the

ladder is held in positive position with relation to the reel and will be regularly wound upon and unwound from the said reel. The main function of this particular attachment is to brace the ladder adjacent to the reel, and in view of the weight imposed upon the ladder it would have a tendency to bulge or buckle in a forward direction as it leaves the reel, and this disadvantage is overcome by the use of the devices just explained, and by adjusting the shaft 39^a and the parts carried thereby through the medium of the pinions 40 engaging the racks toward the reel a strong counter-brace is provided, which will overcome any forward buckling tendency of the ladder adjacent to the reel. The shaft 39^a will also be adjusted proportionate to the variation in the inclination of the ladder and controlled by means heretofore explained, and to maintain the shaft 39^a and the parts cooperating therewith in a fixed adjusted position in the supports an L-shaped pawl 45 is secured to the outer side of one of the pinions 40, preferably that one adjacent to the crank-handle 41, to drop in between the rack-teeth 39 and prevent outward movement of the said shaft. It will be observed that the pawl 45 will permit the shaft to be adjusted inwardly toward the reel without disengaging said pawl from the rack-teeth; but when it is desired to move the shaft outwardly away from the reel the pawl must be manually disengaged and held elevated from the rack-teeth until the desired outward adjustment has been completed.

The sections or links 20 of which the ladder is composed are made light and formed of sheet-steel or analogous metal and hingedly connected at their upper and lower rear end portions by rods 46, which serve as rounds in the ladder construction. Each link or section is made up of a doubled or bent piece of material having inturned rear edge flanges, the edges of said flanges abutting against each other when weight-pressure is imposed upon the ladder, as clearly shown by Fig. 9, and by this means the several sections or links are strengthened and rendered more durable and the several sections will also be thereby prevented from buckling or bending at their lower ends, owing to the bracing action of said flanges. Another improved feature embodied in the links or sections 20 is brace-tongues 48, located therein and coacting with the front sides thereof, the end of each tongue 48 being secured to the upper inner portion of the front side of one link or section and having a slightly-curved projection 49 to extend across the lower front portion of the next section above close to the front wall or side of said upper section, and throughout the whole series of links or sections these brace-tongues relieve the front portions of the links at their joints from a clutching strain and resist any tendency toward buckling in a rearward direction and also relieve the rods 46 and the parts of the links or sections which they en-

gage from a large proportion of wearing and breaking strain. The tongues 48 are so disposed in relation to the links that when the ladder is wound the links will be free to break or open, as clearly shown by Fig. 7, to conform to the curvature of the reel, and the curved projections 49 avoid any tendency toward obstruction to the closing movement of the links at their front portion when the ladder is elevated or unwound from the reel.

It will be observed that the several parts of the ladder are reinforced against twisting movement or lateral bending movements, and in view of the several devices used to brace the ladder a number of persons or firemen can ascend or descend thereover and several hose-lines may be drawn upwardly and supported by the ladder without liability of straining or breaking the same, with obvious advantages in extinguishing fires and arranging to throw water into parts of buildings at different elevations.

Another advantage of the improved construction is that by having the ropes or cables 5 engage the drums 8 and 10 in the manner set forth the use of pawls or other controlling means in relation to said drums is unnecessary in order to maintain the coils or sections of the said ropes or cables wound about the said drum in proper taut condition in view of the fact that the number of coils engaging the opposite portions of the drums 8 and 10 will set up sufficient counteracting friction to prevent the said coils from slipping or running loose, and hence the coils will regularly move over the drums.

The several parts of the apparatus may be easily reduced to compact form for transportation, and the truck will be equipped with means for supporting firemen or others at opposite sides, such as running-boards or hanging frames, and when the braces 32 are not in use they will be hung at suitable points on opposite sides of the truck-frame.

The several features embodied in the improved ladder mechanism are lightness, strength, and durability, and the advantages incident to the quick arrangement of the ladder for use, together with the provision of the elevator 31, will contribute to the production of a machine of a valuable and inexpensive nature.

Having thus fully described the invention, what is claimed as new is—

1. In a device of the class set forth, the combination of a reel having ropes or cables arranged to wind on and unwind from the opposite ends thereof, a jointed ladder adapted to be wound on and unwound from the said reel, and having the said ropes or cables attached thereto to wind and unwind equally therewith, compensating drums engaged by said cables or ropes, a third rope or cable connected to the ladder to wind and unwind with the latter in relation to the reel, a boom engaged by the said third rope or cable, and means for adjusting the boom without disturbing

the tautness of the rope or cable in engagement therewith to vary the inclination of the ladder, when projected.

2. In a device of the class set forth, the combination with a projectible jointed ladder, and means for operating the said ladder, of a rotatable device on which the ladder is adapted to be wound, a support in advance of and in elevation above the said rotatable device, a boom pivotally secured at its inner end on the top of the said support, a rope or cable secured at opposite extremities of the ladder and engaging the outer end of the boom to hold the ladder-sections in rigid condition, and means connected to the boom for moving the latter and the projected ladder to change the inclination of said ladder without disturbing the degree of tautness of the rope or cable engaging the boom.

3. In a device of the class set forth, the combination of a reel, a jointed ladder adapted to be wound on and unwound from the said reel and comprising a series of movably-connected sections which gradually decrease in width toward the end of the ladder which is projected to the highest elevation, means for holding the ladder, when projected, at any desired angle of inclination, and combined cutting and bracing means adjacent to the reel through which the ladder-sections have movement and provided with transversely-shiftable devices automatically operating to compensate for the differentiation in the width of the ladder-sections, guiding and bracing means preventing the ladder from buckling in a forward direction.

4. In a device of the class set forth, the combination of a reel, a jointed ladder adapted to be wound upon and unwound from the said reel and projected above the latter, means for winding and unwinding the ladder, and a combined automatically-moving guide and bracing mechanism adjacent to the reel and comprising supports having racks, a shaft with pinions engaging the said racks, and guide-frames with rotatable devices therein through which the ladder-sections have movement, the said guide-frames by their automatic movement compensating for a variation in the width of the successive sections of the ladder.

5. In a device of the class set forth, the combination of a reel, ropes or cables engaging the opposite ends of the reel to wind thereon and unwind therefrom, the said ropes or cables being connected to the reel ends, compensating drums engaged by the said ropes or cables and drawn toward the center of the reel thereby, a jointed ladder connected to said ropes or cables and with the latter adapted to be wound upon and unwound from the reel, a rope or cable passing through the ladder and connected to an elevator, and an elevator-drum independent of the compensating drum for receiving the rope or cable attached to the elevator and provided with means for controlling the operation thereof.

6. In a device of the class set forth, the combination of a projectible jointed ladder adapted to be reduced to compact form, a rope or cable for holding the parts of the ladder in
5 rigid engagement to prevent buckling and opening of the same, and bracing means adapted to be interposed between the ladder and said rope or cable and comprising an outer bearing-bar to engage the rope or cable,
10 and opposite pairs of divergent movably-connected arms having terminal elements to removably fit over the ladder-rounds.

7. In a device of the class set forth, the combination with a reel, of a reducible ladder
15 adapted to be wound on and unwound from said reel and comprising a series of hinged sections, and braces secured to the inner sides of the front edges of said sections and projecting above the upper ends of the ladder at
20 points opposite the hinged joints thereof to

engage the inner lower portions of successive sections, the terminals of the tongues being slightly bent rearwardly.

8. In a device of the class set forth, the combination with a reel, of a jointed ladder adapted to be wound on and unwound therefrom
25 and comprising a series of bent metal sections having rear intumed flanges, the said flanges having their edges brought into contact when weight is imposed upon the ladder to prevent buckling of the links at such
30 points, and means for operating the reel and ladder.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM HUBARTT.

Witnesses:

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BERNARD P. VASHON.