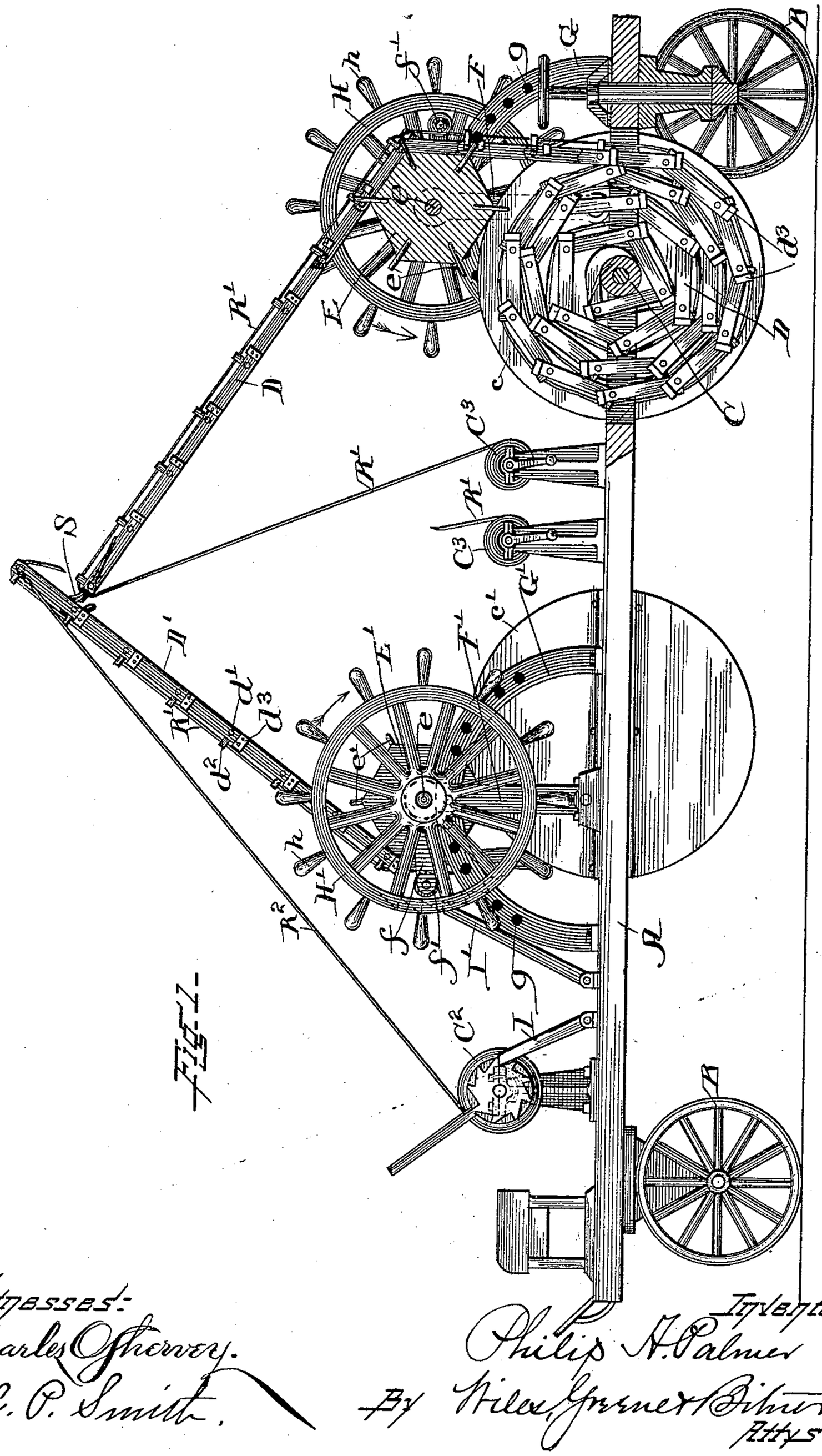
(No Model.) 2 Sheets—Sheet 1.

P. A. PALMER.

FIRE ESCAPE LADDER AND MEANS FOR RAISING THE SAME.

No. 481,967. Patented Sept. 6, 1892.



Witnesses:-
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(No Model.) 2 Sheets—Sheet 2.

P. A. PALMER.

FIRE ESCAPE LADDER AND MEANS FOR RAISING THE SAME.

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Fig. 2.

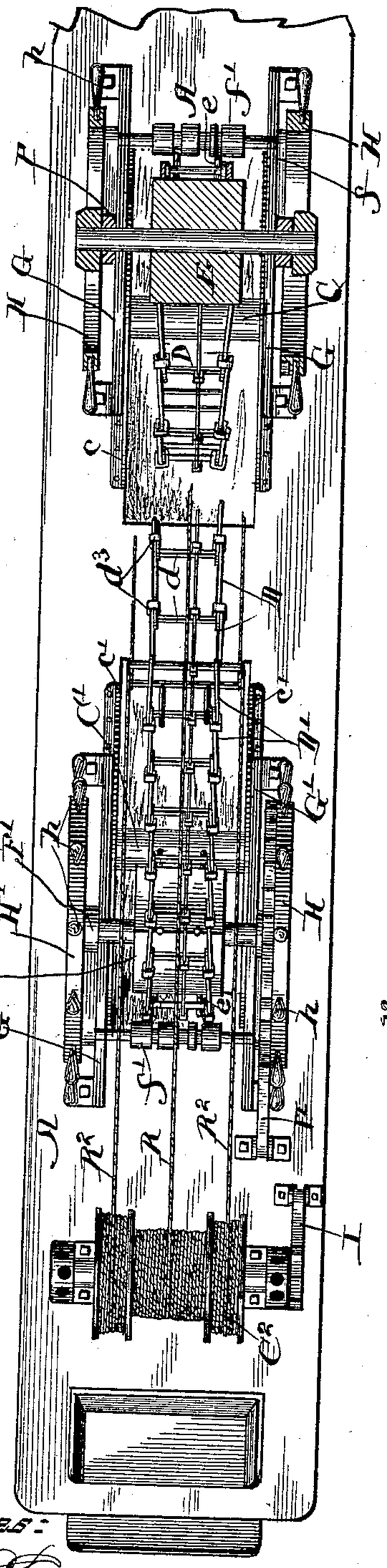


Fig. 5.

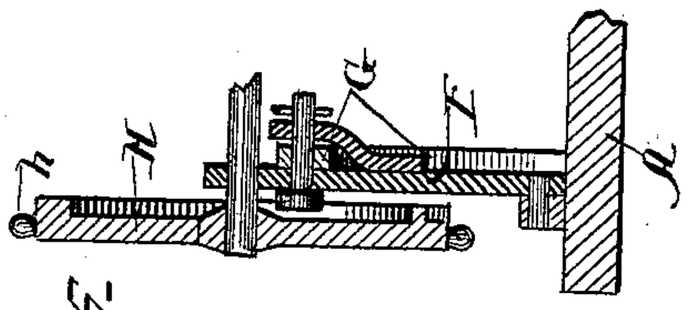


Fig. 4.

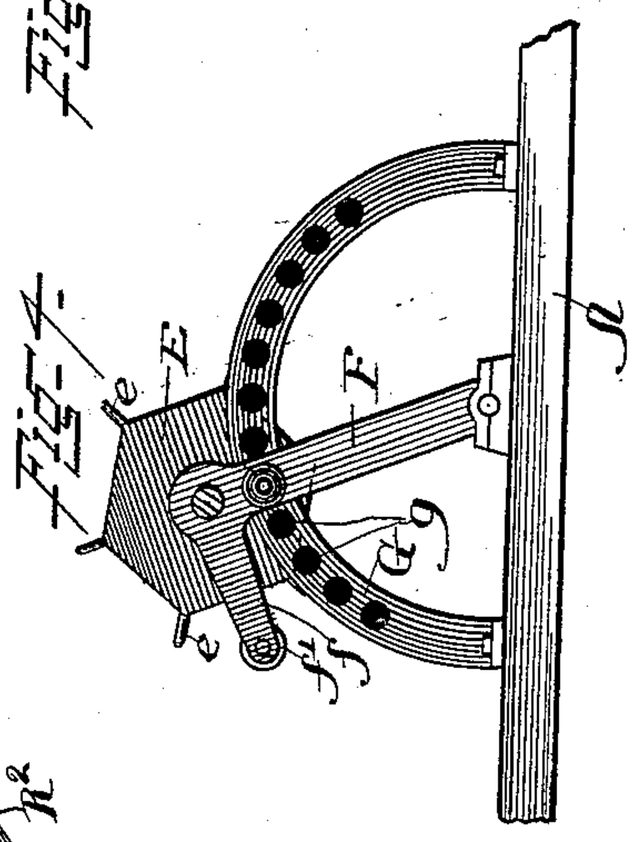
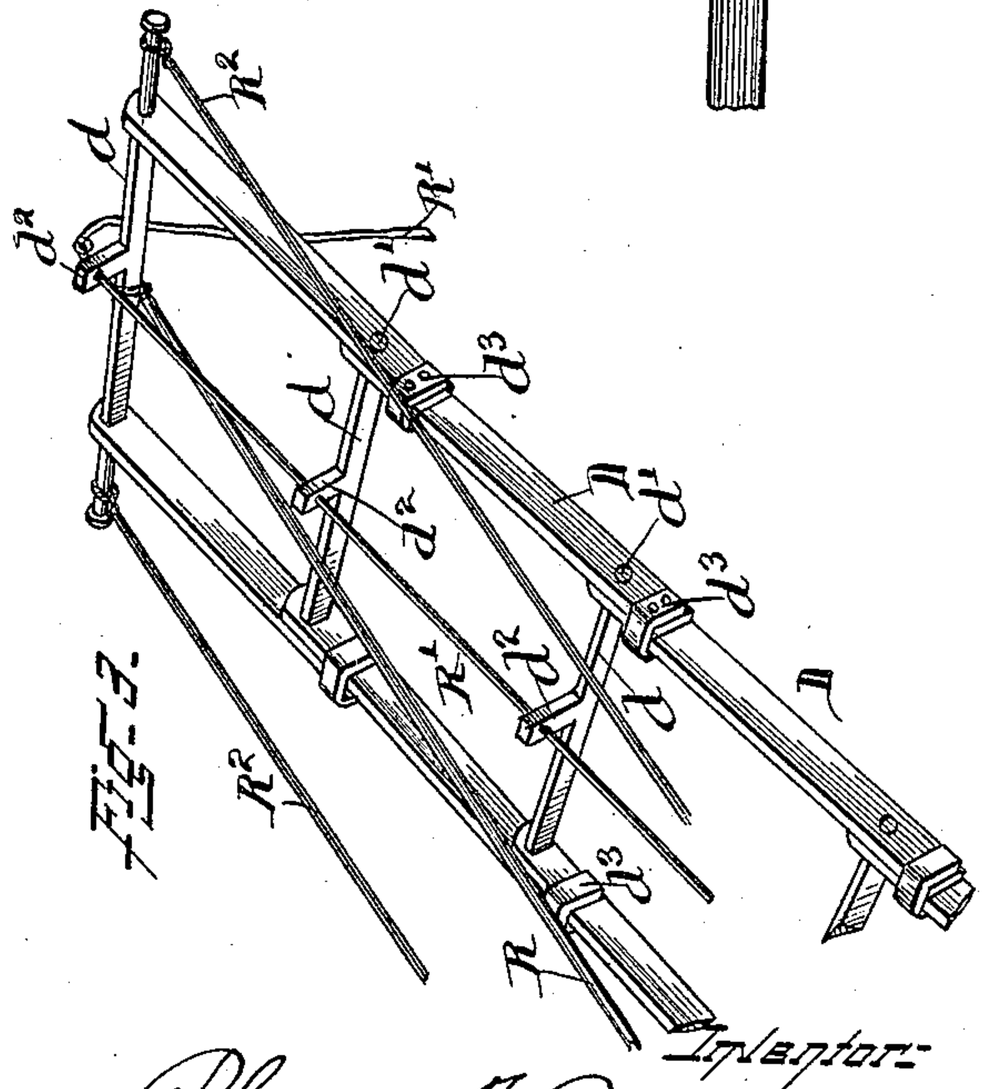


Fig. 3.



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Inventor:
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UNITED STATES PATENT OFFICE.

PHILIP A. PALMER, OF CHICAGO, ILLINOIS.

FIRE-ESCAPE LADDER AND MEANS FOR RAISING THE SAME.

SPECIFICATION forming part of Letters Patent No. 481,967, dated September 6, 1892.

Application filed September 24, 1891. Serial No. 406,729. (No model.)

To all whom it may concern:

Be it known that I, PHILIP A. PALMER, a citizen of the United States of America, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Fire-Escape Ladders and Means for Raising the Same, of which the following is a specification.

My invention relates to improvements in fire-escape ladders and means for raising the same, the object of the invention being to combine in a single portable apparatus a ladder of any desired length and means for raising the same for use, the ladder being preferably so constructed as to be folded or rolled when not in use.

The invention is fully described and explained in this specification and shown in the accompanying drawings, in which—

Figure 1 is a side elevation of an apparatus embodying my invention. Fig. 2 is a top plan thereof. Fig. 3 is a perspective view of a portion of a ladder of preferred construction, and Figs. 4 and 5 are detail views illustrating the connection of certain parts of my apparatus.

In the views, A is a wagon-bed of such length as to support the various parts of my device, and B B are wheels mounted on suitable axles attached to the bed in the ordinary manner.

Upon the bed, at suitable distances apart, are mounted the shafts of two drums C C′, on which are rolled two jointed ladders D D′, having substantially the construction shown in Figs. 1, 2, and 3, but more particularly in Fig. 3, which is on a larger scale than the others. As illustrated in these figures, each of the ladders is made up of a series of pieces D or D′, pivoted together by means of the ends of the rounds, the rounds being placed at the upper end of each section but at some distance above the lower end of the section next above, so that the lower end of each of the short side pieces overlaps the upper end of the one next below it. The lower end of each side-bar section is provided with a clasp d^3, rigidly fastened to it and of such shape as to extend over and embrace the next succeeding section, and by means of these clasps the entire ladder, when brought into a straight line, is enabled to resist pressure against its face in one direction, although it bends freely in the opposite direction. When the ladder is extended with the clasps in the position shown in Figs. 1 and 3 if its upper end be rested against a suitable support or otherwise properly braced, the ladder is rigid and is substantially as strong as if formed in a single piece. Each of the rounds d of the ladder is so connected with the upper ends of the side pieces of the section to which it is fastened as not to turn with reference thereto, though the lower ends of the next succeeding section are pivoted upon the ends of the round and turn freely thereon. On each of the rounds, and preferably near its middle point, is formed a short arm or extension d^2 at right angles to the plane of the section to which the round is fastened, and all the arms or extensions d^2 are formed with holes near their ends, through which a wire rope R′ is passed, a knot being formed in the rope above the last round of the ladder to prevent accidental escape of the rope from the arms. When the ladder has been extended, the tightening of this rope braces the ladder against bending in the direction permitted, by the pivot-joints and forms an additional element of stiffness and strength. Both the drums C C′ are provided at their ends with circular shields $c\,c'$, adapted to guide the ladders as they are wound upon or unwound from the drum, these shields being either stationary upon the bed or formed upon the drums and turning therewith.

Above the drums C C′ or in other suitable position in relation thereto are two lifting-reels E E′, provided with projecting fingers $e\,e'$ and mounted on shafts which are journaled in swinging supports F F′, pivoted to the wagon-bed and adjustably secured by means of segments G G′, fastened to the wagon-bed. The swinging supports F F′ may be secured at any desired angle in any suitable manner, but preferably by forming each of the segments G G′ with a number of holes g and providing each of the swinging supports with a clasp adapted to embrace the segment in the manner illustrated in Figs. 4 and 5, a suitable pin or bolt being passed through the support, the clasp, and any given hole of the corresponding segment. The angular distance between the fingers on each of the lifting-reels is substantially the same as

the distance between the consecutive rounds of each of the ladders, and it is evident that by turning the reels in the direction indicated by the arrows in Fig. 1 both of the ladders may be lifted, section by section, into the air, provided the upper end of each ladder is suitably braced so as to fix its angle of inclination. The reels may be turned in any desired manner; but I prefer to place upon the ends of the shafts of the two reels operating-wheels H H′, provided with handles *h*, by means of which the reels may be turned, each of these wheels being provided with ratchet-teeth engaging a pawl I′, as shown in Fig. 1, for the purpose of preventing accidental reverse rotation of the wheel and the reel to which it is attached.

In order to prevent accidental displacement of the foot of each of the ladders as it is raised, I have combined with each of the reels a roller *f′*, parallel with the face of the reel and supported in the ends of two arms *f*, formed integrally with the swinging supports of the reel. These rollers *f′* are so placed as to permit the ladder-sections to pass between them and the corresponding reels, and each of the rollers is grooved to permit the projecting parts of the sections to pass freely up and down. While the space between each of these rollers and the corresponding reel is sufficient to permit the passage of the ladder-sections, it is not, however, sufficient to permit entire escape of the sections from the support of the fingers on the lifting-reels, and any accidental displacement of the lower end of either of the ladders is therefore prevented.

Near each end of the wagon-bed is placed a windlass C^2, journaled in suitable bearings and having at its ends a series of holes for the reception of a lever to be used in turning the windlass which is intended to receive and pay out a series of wire guy-ropes R R^2, the rope R being fastened to the center of the top round of the corresponding ladder and the ropes R^2 being fastened to the outer ends of said round. The surface of the windlass is divided by suitable flanges into three spaces, one at the center and one at each end, the central space being intended to receive the rope R and the others to receive the ropes R^2, this division being made for the purpose of separating the ropes R^2 as much as possible and giving as much lateral support to the ladder as can be obtained by the use of a windlass of ordinary length. By means of these ropes the inclination of each ladder is determined, and it is also given material lateral support, though the lateral bracing thus afforded may be supplemented by the use of other guy-ropes fastened to the top of the ladder and secured at the bottom at suitable distances from the base of the ladder.

Each of the windlasses has at one end a ratchet-wheel which engages with a pawl I, adapted to prevent accidental reverse rotation of the windlass.

In addition to the windlasses C^2, I have mounted upon the wagon-bed, near its center, two other windlasses C^3, adapted to tighten the ropes R′, which extend through the arms d^2 on the rounds of the ladders. This is necessary in order that the ropes may brace the ladders in the manner hereinbefore set forth.

It is evident that by the means hereinbefore described the two ladders may be raised independently of each other and at any given angle of inclination. It is sometimes desirable, however, to raise them together, one of the ladders being used as a brace for the other in the manner indicated in Fig. 1. Where this is done one of the windlasses C^2, with its guy-ropes, may be dispensed with, the ladder which has no guy-ropes being secured at its upper end to the other ladder by means of hooks S, Fig. 1, or in any other desired manner, and its angle of inclination being fixed thereby. In such case the bracing-ladder may be lifted entirely by the other ladder, if desired; but I prefer to provide it with an independent lifting-reel in order not to subject the lifting apparatus of the other ladder to the strain of the weight of both the ladders.

As shown in the drawings, each of the ladders is made up of sections having a length substantially equal to the distance between two contiguous rounds; but it is evident that a ladder of considerably greater length might be lifted by means of one of the wheels shown herein, either with or without the guy-rope windlass. I have, in fact, found it convenient to make the terminal or top portion of each ladder in a single rigid piece of considerable length, which may be raised bodily before beginning the unwinding of that part of the ladder wound about the drum, and the proportionate length of this rigid portion in comparison with that made up of short sections may of course be limited, according to convenience, without changing the principle of my invention.

Having now described and explained my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a sectional ladder, of swinging supports F, formed with arms *f*, a reel E, mounted between said supports and having fingers *e*, a roller *f′*, mounted between the ends of the arms *f* and separated from the reel by a space sufficient for the passage of the ladder, a windlass C^2, guy-ropes R R^2, coiled on the windlass and fastened to the topmost section of the ladder, and means for rotating the reel and windlass, substantially as shown and described.

2. The combination, with the folding ladder, of swinging supports F, segments G, the reel E, mounted in said supports, means for rotating the reel, and means for fastening the swinging supports at any desired angle upon the segments, substantially as shown and described.

3. The combination, with a wagon-bed, of two drums mounted thereon, sectional lad-

ders constructed substantially as described and wound upon said drums, lifting-reels placed in proper relation to said drums and provided with fingers adapted to engage the successive rounds of said ladders, means for connecting the upper end of one of said ladders with the other ladder at any desired point, guy-ropes for bracing one or both of said ladders, and means for rotating the lifting-reels whereby said ladders may be raised, substantially as shown and described.

PHILIP A. PALMER.

Witnesses:
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CHARLES O. SHERVEY.