

(No Model.)

2 Sheets—Sheet 1.

L. DEDERICK.  
EXTENSION FIRE LADDER.

No. 383,106.

Patented May 22, 1888.

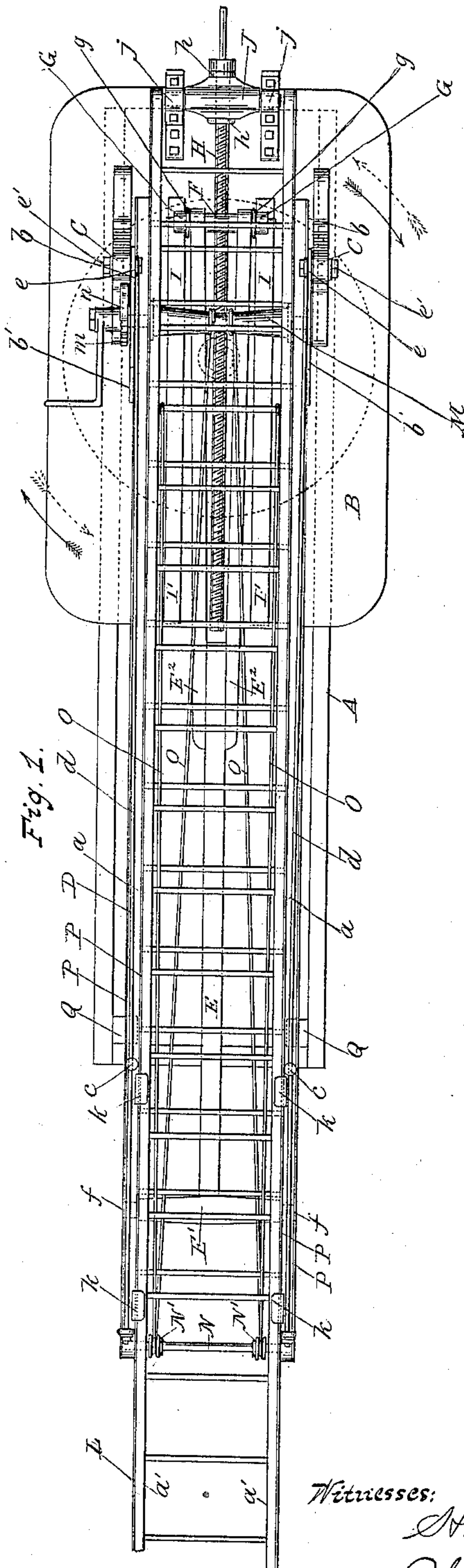


Fig. 1.

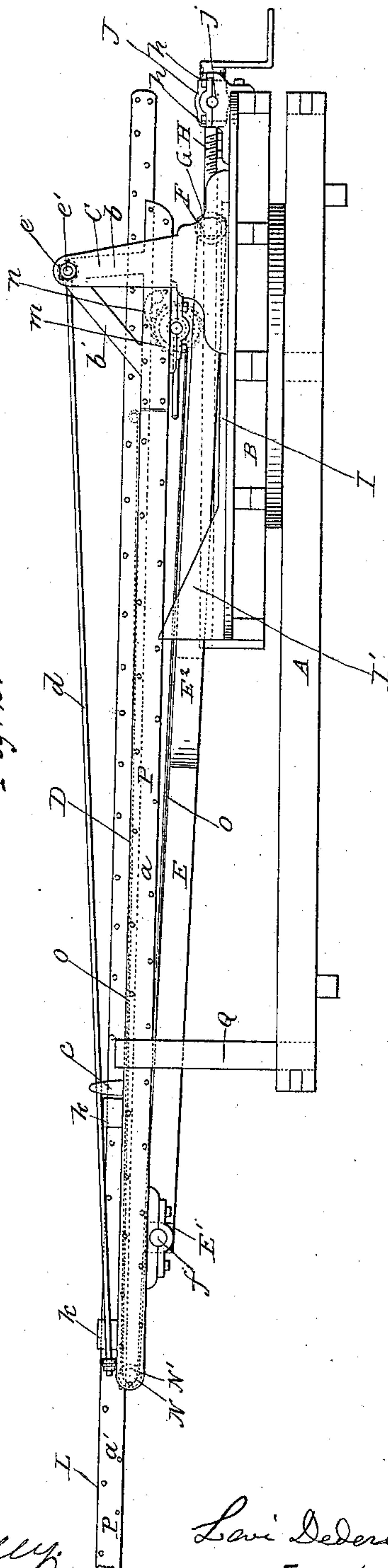


Fig. 2.

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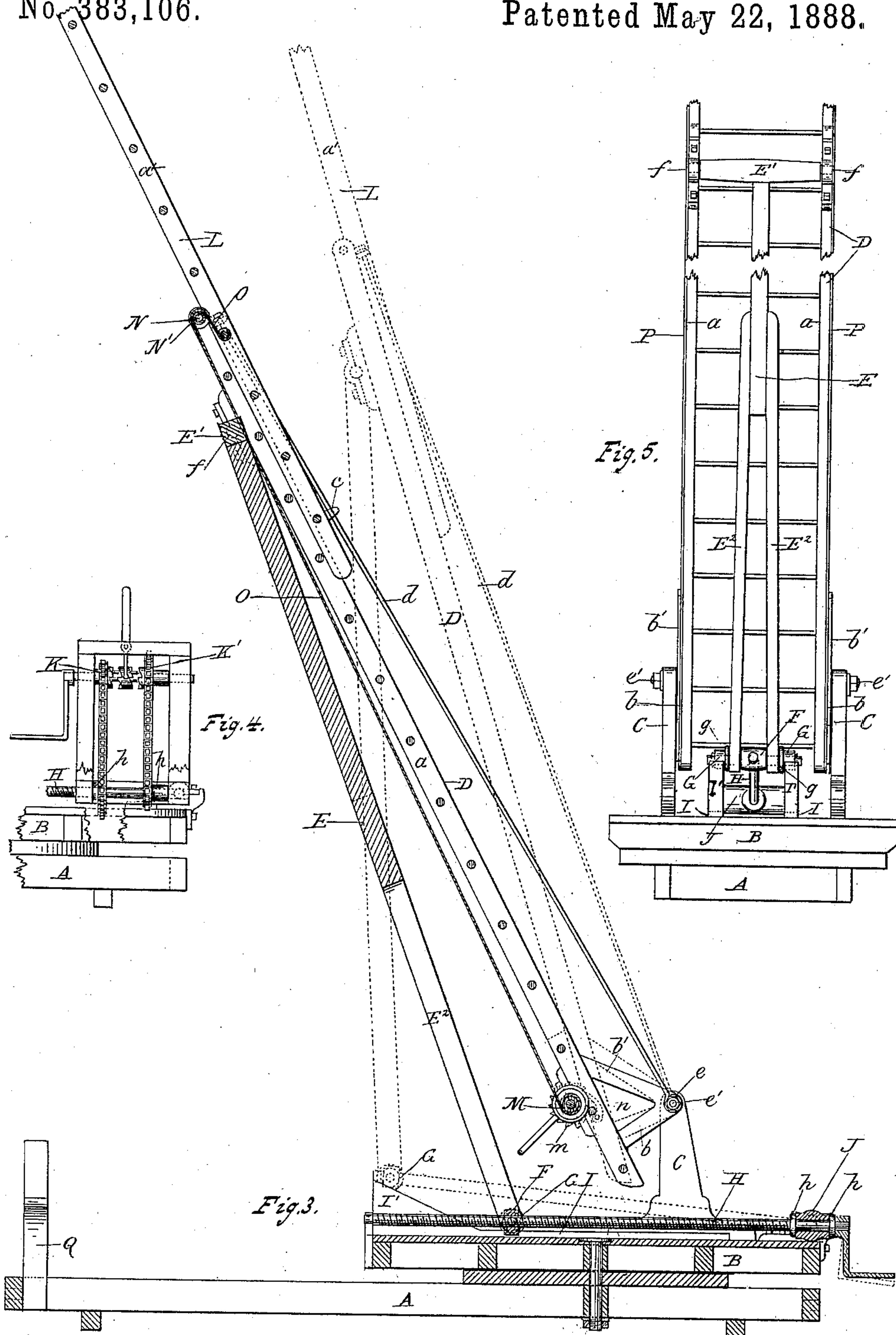
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*Charles D. Kelly.*

*Levi Dederick.*  
Inventor.  
*His Attorney Alex. Kellogg.*



# UNITED STATES PATENT OFFICE.

LEVI DEDERICK, OF ALBANY, NEW YORK.

## EXTENSION FIRE-LADDER.

SPECIFICATION forming part of Letters Patent No. 383,106, dated May 22, 1888.

Application filed April 5, 1887. Serial No. 233,696. (No model.)

*To all whom it may concern:*

Be it known that I, LEVI DEDERICK, a citizen of the United States, residing at Albany, in the county of Albany and State of New York, have invented certain new and useful Improvements in Extension Fire-Ladders, of which the following is a specification.

My invention relates to extension fire-ladders which are capable of being raised from a horizontal position and situation on a platform or truck to one of greater or less elevation in an inclined or vertical position; and it consists of the combinations of devices and elements hereinafter particularly described, and specifically set forth in the claims.

The objects of my invention are, first, to provide a strong and durable extension-ladder with a reliable supporting-prop which will so stiffen the base of the ladder as to give it a reliable holding of the load which may be placed on its upper portions; second, to provide, with a supporting-prop of an extension-ladder simple and efficient mechanism by which the said prop will be operated to effect an elevation of the ladder from a horizontal position to an inclined or nearly vertical one, and be made to give a reliable support to the ladder at whatever angle it may be set; third, to provide, in extension-ladders, a truss form of construction of its side pieces, and, further, to provide, in an extension fire-ladder, such a form of construction and arrangements and combinations of parts as will make the ladder simple and strong in its construction, easily operated, and not liable to have its parts disarranged or get out of order. I attain these objects by the means illustrated in the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a plan view of my improved extension fire-ladder. Fig. 2 is a sectional elevation of the same when the several parts of the apparatus are folded down for transportation. Fig. 3 is a sectional elevation illustrating the ladder elevated and extended, and the manner it is supported. Fig. 4 is an elevation of a mechanism by which the ladders will be raised or lowered. Fig. 5 is a view of the lower ladder and its supporting-prop and mechanism for operating the same, viewed from the rear side when the ladder is elevated.

The same letters of reference refer to like parts throughout the several views.

In the drawings, A represents a platform-truck of suitable form of construction of parts for holding the operating parts of the apparatus.

B is an upper platform mounted on a suitable turn-table circular track and capable of being turned in either direction.

C C are suitable posts firmly secured to the upper platform, B. These posts support the base end of lower ladder.

D is the lower or suspended ladder, and has secured to its side rails, *a a*, at or near their lower ends, the suspension-brackets *b b*, which brackets are made to project at an angle to the faceside of the ladder, and are braced by braces *b' b'*. The outer ends of these suspension-brackets are perforated to receive the pivot-bolts on which these brackets swing in their connection with ladder D. This suspended ladder is strengthened by means of truss-rods *d d*, which are extended from the upper ends of the side rails, *a a*, to the pivot-holes in brackets *b b*, by which the ladder is suspended. Suitable tie-loops, *c c*, one or more with each side rail, are provided, to hold with said truss-rods to prevent them springing toward or from the side rails. The lower ends of these truss-rods are each provided with an eye, *e*, which receives the pivot-bolt *e'*, on which the ladder, by its brackets, swings.

E is the supporting-prop to the ladder, which prop is jointed at its upper end with the upper part of the ladder, preferably by means of the roller-bar *E'*, which is provided at its ends with suitable journals, which have support in bearings *f* secured to the side rails, *a a*, of ladder D. This prop is made to have its lower end portion bifurcated with limbs *E<sup>2</sup> E<sup>2</sup>* at a suitable distance apart to give to the prop, of which they form integral parts, suitable stiffness in a lateral direction.

F is a roller-nut having suitable journals, which work freely in bearings in or with the lower or base ends of the limbs *E<sup>2</sup> E<sup>2</sup>* of prop E, and the ends of the journals of this roller-nut are extended outwardly from the outer sides of limbs *E<sup>2</sup>* to a suitable distance to receive friction wheels or rollers *G G*. Central in this roller-nut is made its screw-threaded hole, which re-



ceives the screw-threaded shaft H, which I prefer to employ as the means for moving the lower ends of the limbs of the prop E back from or toward the posts C C.

5 I I are suitable tracks secured on platform B and extended from a point relatively at a short distance forward of the centers of posts C to the rear end of the platform B. These tracks are arranged to such a distance apart as to be  
10 suitable to receive the friction-rollers G G, which latter are flanged on their inner sides, so as to have suitable bearings on the inner edges of the tracks, while the tread-surface of these rollers will have bearing on the top sur-  
15 faces of these tracks. The inner side flanges, *g*, of these rollers G operate to hold with the tracks to prevent any lateral shifting of the lower ends of the limbs of prop E.

J is the screw-shaft head-block, having a  
20 pivoted connection with platform B by means of bearings *j j*, secured to said platform at a point on the same which will be relatively forward of posts C C. This head-block can be made with any suitable form of construction  
25 to adapt it to receive the head end of the screw-shaft H and hold it relatively close to the upper side of platform B.

Screw-shaft H is provided with a suitable screw-thread corresponding with that made in  
30 roller-nut F, and has its head end held from shifting endwise in its head-block J by means of suitable collars, *h h*. This screw-shaft is operated by a suitable crank applied directly to the shaft or to a sprocket or gear wheel  
35 shaft, which will co-operate to revolve another sprocket wheel or gear secured to the head end of said screw-shaft.

In Fig. 4 is shown a fast and slow speed system of sprocket-wheels and chains for operat-  
40 ing the screw-shaft H in one direction, as when elevating the ladder at a slow speed, and in the opposite direction at a higher speed, as when lowering the ladder. A shifting-clutch between sprocket-wheels K K' will enable an  
45 operator to use at will either the fast or slow speeding wheels for revolving the screw-shaft.

L is the upper ladder, which is made with a width from outside to outside of its side rails, *a' a'*, corresponding with the width between  
50 the inner sides of rails *a a* of the lower ladder, so that the upper ladder will nicely slide between the side rails of the lower one. This upper ladder is held with the lower ladder by means of suitable holding-lips, *k*, secured to  
55 the side rails of the lower ladder, and having bearing on the upper side edges of the side rails, *a' a'*, of the upper ladder. These holding-lips are secured to upper portion of the lower ladder, one at each side rail at the top thereof  
60 and the other at a distance below suitable for giving a secure holding to the foot end of the upper ladder when it is elevated.

M is a windlass held in suitable bearings secured to the under side of the lower ladder  
65 and near its lower or forward end. This windlass is operated by any suitable mechanism,

and preferably by a crank or its equivalent hand-wheel. On the shaft of this windlass, or with one of its end heads, is a ratchet-wheel, *m*, with which works a suitable pawl, *n*. This  
70 windlass can be provided with a friction-brake of any known suitable construction for use in lowering the second or upper ladder. Mounted loosely on shaft N at the upper end of the lower  
75 ladder, D, and secured with the same, are rollers or sheaves N' N'. Ropes O O of equal length are secured to the upper ladder at any suitable point in its length above its lower  
80 end, and at, say, the third or fourth round from the foot end, and are then run over the rollers N' N', and thence down or forward to the windlass M, where they are secured. The  
windlass is shown to be made with a double tapering form, in which the smallest diameters  
85 are at about the middle of length of the windlass and the largest diameters at the outer ends of the same, and the ropes O O are so coiled on these tapering portions of the wind-  
lass that the smallest diameter of the same will receive the coil at the commencement of the  
90 rise of the upper ladder and unwind from the same at the ending of the drop of the same, so that the brake (not shown) will operate more effectively at the finish of the drop than it  
95 would do were the diameter of the windlass greater at the finish of uncoil of those ropes.

I' I' are inclined tracks extended rearwardly from the rear ends of the level tracks I I, of which latter these inclined tracks are continua-  
100 tions. These inclined tracks are at the same distance apart as tracks I I, and friction-rollers G G will ride on the same when the screw-shaft H is operated sufficiently in the proper  
direction, and quickly raise the prop E and carry it to a vertical position for elevating the  
105 ladders more nearly to an upright position, as shown by dotted lines in Fig. 3.

P P are plates of steel secured to the outer sides of the side rails, *a' a'*, of the upper lad-  
der, and to the side rails, *a a*, of the lower one. 110 These plates are made with a thickness of about one-eighth of an inch, and cover the outer sides of said rails, and are suitably secured thereto by rivets or bolts. If selected, a flange or  
115 angle limb can be turned on each edge, so as to have bearing on the upper and lower edges of said rails, while the bodies of these stiffening steel plates will have bearings on the side surfaces the same as when the angular flanges  
120 are omitted. By use of these thin steel plates I am enabled to use lighter side rails in the ladders—that is to say, while I would use a  
depth of side rail the same as when the stiffening steel plates are omitted, I would use side  
125 rails of less thickness from inside to outside surfaces, and with these thin steel plates so stiffen the side rails of these ladders as to make them capable of sustaining a great weight  
without materially deflecting from a straight  
130 line.

Metal rods, forming the truss-rods *d d*, as shown in the drawings, can be dispensed with,



and wooden bars or strips or rails suitably secured at both ends, and holding with the suspension-brackets *b b*, can be used.

The supporting-prop *E* can be made to consist of two pieces or limbs extending from the roller-nut *F* to the roller-bar *E'* or side rails of the lower ladder. In some cases, as in light ladders, the rollers *G*, at the foot end of the prop *E*, may be dispensed with, and flanged shoes be used in lieu thereof; and, if preferred, the inclined tracks *I' I'* can be made adjustable by hinging their forward ends with the terminating ends of tracks *I*, or to the platform at said ends, when the rear ends of said tracks *I' I'* will be depressed or elevated by means of suitable jacking-screws.

The truck *A* will be mounted on suitable wheels for convenience of transportation.

The manner in which the parts of this apparatus are operated is as follows: When the parts are in normal situation and position in relation to each other, the upper ladder, *L*, will lie between the side rails, *a a*, of the lower ladder, and with its foot end at or little past the foot end of the latter, as shown in Figs. 1 and 2, and the ropes *O O* will be nearly unwound from the windlass *M*, and will connect said windlass with the upper ladder, and both ladders will be supported in front from suspension-brackets *b b* and rearwardly by standards *Q*. When the ladder is to be elevated, the operator will by means of the crank revolve the screw-shaft *H*, when it will operate to move the roller-nut and the connected foot end of prop *E* rearwardly, when the foot end of said prop will also be carried rearwardly and be supported from tracks *I* by the rollers *G G*. In this rearward movement of the foot end of said prop the roller-nut will gradually roll in its bearings at the foot of said prop, while the roller-bar *E'* of the prop will gradually roll in its bearings on the lower ladder, and at the same time the endwise movement of the prop will be checked by the draft of the ladder *D* on posts *C*, and as said ladder is pivoted with said posts by the suspension-brackets *b b* the rearward movement of the roller-nut *F* will effect a gradual elevation of the rear end of the prop at its pivoted connection with ladder *D*, and thereby elevate said ladder, while the weight of that ladder will hold the flanged rollers *G* on their tracks *I*; and when the foot end of the prop has been carried rearwardly on tracks *I* to near the point of their connection with inclined tracks *I'* the ladder will be raised to a considerable elevation, and at the same time be securely supported by prop *E*, which latter will be held from shifting sidewise by the flanges on rollers *G*, holding with the side edges of track *I*, and also be held from slipping forward by the screw-shaft *H*, holding with the roller-nut *F* in the foot of the prop. When the screw-shaft is further operated, the foot end of the prop will be raised above the plane of the upper side of track *I*, as the rollers *G* are made to climb the inclined tracks *I'*, when the ladder *D* will

be elevated nearer to a perpendicular with the prop, also approaching a perpendicular, as illustrated in Fig. 3. By means of the crank of windlass *M* the operator will through ropes *O O* move the upper ladder, *L*, endwise upwardly to a sufficient distance to carry its upper end to a height corresponding with the window or roof of the building to be reached, when pawl *n* will engage with ratchet-wheel *m* to hold this upper ladder secure from dropping or sliding down. When the load on the ladder or ladders is at any point above the points of the pivot-connection of the prop *E* with ladder *D*, the said point will be in fact the fulcrum of the lever in the ladders thus weighted, and the weight will tend to bend the ladder *D* below the pivot connection of the prop with it; and by the use of the truss-rods *d d* the side rails of the ladder *D* will be relieved of their bending strain, and the weight will be made to pull on posts *C* through the truss-rods *d*. The suspension brackets *b b* operate to bring the ladder *D* to near the platform when the former is folded down, as shown in Fig. 2.

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

1. In an extension fire-ladder, the combination, with a platform and posts projected from its upper side, of a ladder provided at its foot end with the angular suspension-brackets projected above the plane of its face side, and the pivot-connections between said brackets and posts, substantially as and for the purposes set forth.

2. In an extension-ladder, the combination, with a platform, supporting-posts rigidly secured to said platform, and a ladder which is pivoted to said posts at the outer-end portions of its brackets *b b*, and adapted to be raised and set at any selected angle, of the truss-rods *d d*, arranged at an angle in relation to the side rails of said ladder and securely connected with the upper ends of the side rails and with the outer ends of brackets *b b*, which are secured to the foot-end portions of said side rails, and the tie-loops *c c* between the upper ends of said side rails and said brackets, substantially as and for the purposes set forth.

3. In an extension fire-ladder, the combination, with the main ladder, on which a sliding ladder is supported when extended, and a supporting-prop, *E*, which is jointed at its upper end with the upper-end portion of the main ladder and has its foot end supported from the platform the main ladder is pivoted to, of the truss-rods *d d*, suspension-brackets *b b*, and tie-loops *c c*, having each secure connection with said ladder, as shown and described, whereby the strain on the main ladder from the leverage of the sliding ladder will be sustained by said brackets, rods, and loops, substantially as and for the purposes set forth.

4. In an extension fire-ladder, and in combination with the lower ladder and its sliding or upper ladder, the former suspended by angular brackets secured to its foot end, a wind-



lass provided with a ratchet-wheel and pawl on the foot-end portion of the lower ladder, sheaves at the upper end, and ropes over said sheaves connecting with the windlass at one  
5 end and with the lower-end portion of the sliding ladder by its opposite end, substantially as and for the purposes set forth.

5. In an extension fire-ladder, and in combination with a main ladder which is jointed  
10 by means of suspension-brackets with supporting posts which are stationary in relation to the platform of the apparatus, a supporting-prop which is jointed with the main ladder and provided on its foot end with a screw-  
15 threaded nut, and the screw-threaded shaft held with the platform from moving endwise and adapted to be revolved at will within said nut, whereby the foot end of said supporting-prop will be moved away from the jointed and  
20 stationary foot end of the main ladder when the latter is being elevated, substantially as and for the purposes set forth.

6. In an extension fire-ladder, the combina-

tion, with the propping-piece jointed with the main or lower ladder, of the tracks secured to  
25 the platform, roller-nut provided with flanged rollers and jointed with the foot end of the said propping-piece, and the screw-shaft operated at will with its screw-threads holding  
30 with said nut and its head end holding with a block secured to said platform, substantially as and for the purposes set forth.

7. In an extension fire-ladder, the combination, with the propping-piece of the main or  
lower ladder, and flanged rollers secured to  
35 the foot end of said propping-piece, and the horizontal plain tracks and inclined tracks connecting with the horizontal tracks, of a screw-shaft which holds with a nut attached  
40 to the foot end of the said propping-piece and with a block secured to the platform, substantially as and for the purposes set forth.

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