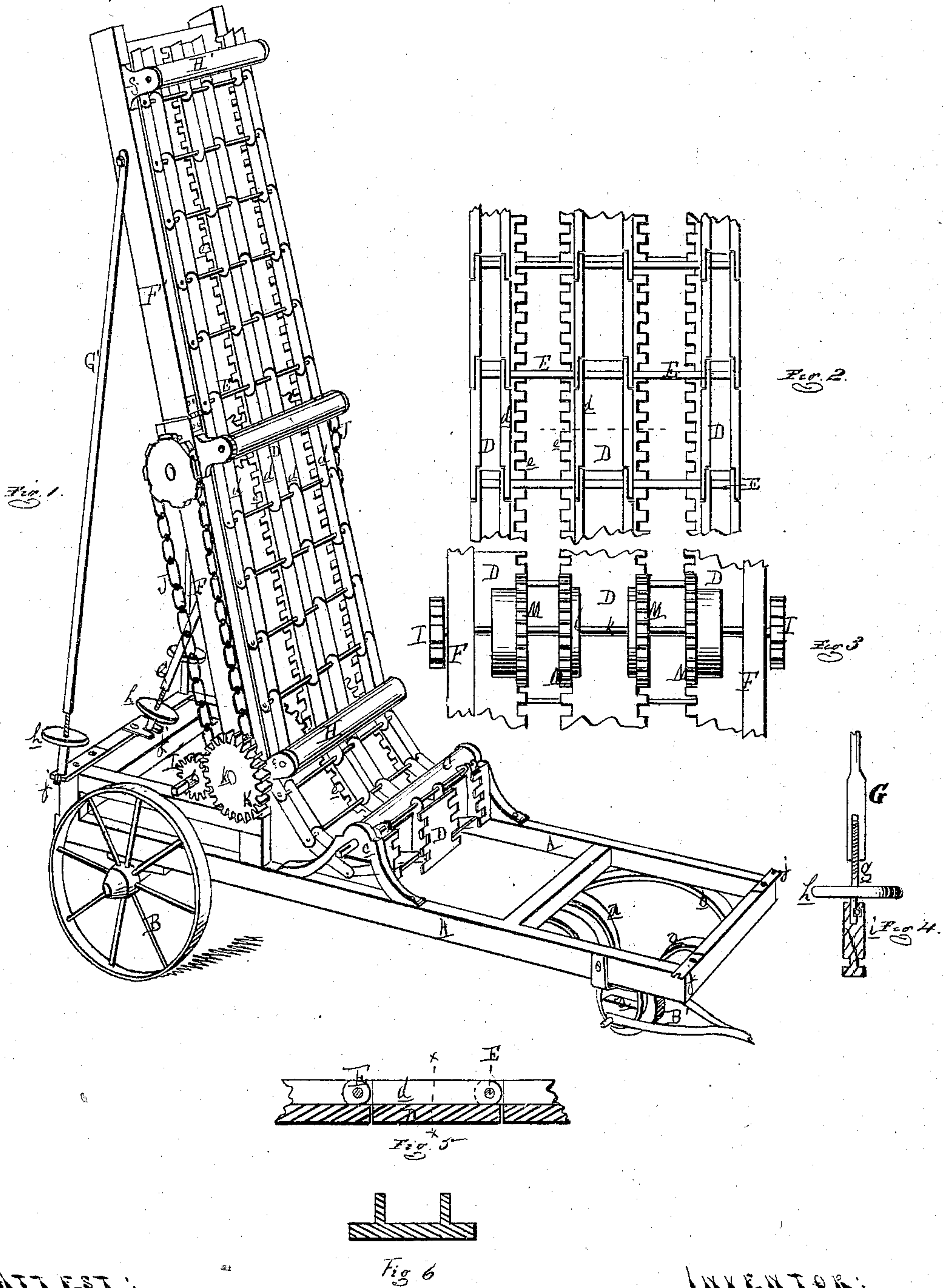


C. H. WHITE.  
Fire Escape Ladders.

No. 138,304.

Patented April 29, 1873.



ATTEST:  
H. Sprague  
Chas. E. Sprague

INVENTOR:  
Chas. H. White  
Thos. S. Sprague atty



# UNITED STATES PATENT OFFICE.

CHARLES H. WHITE, OF WHITE'S STATION, MICHIGAN.

## IMPROVEMENT IN FIRE-ESCAPE LADDERS.

Specification forming part of Letters Patent No. **138,304**, dated April 29, 1873; application filed January 21, 1873.

*To all whom it may concern:*

Be it known that I, CHARLES H. WHITE, of White's Station, in the county of Calhoun and State of Michigan, have invented a new and useful Improvement in Firemen's Extension-Ladders; and I do declare that the following is a true and accurate description thereof, reference being had to the accompanying drawing and to the letters of reference marked thereon and being a part of this specification, in which—

Figure 1 is a perspective view of my improved ladder extended. Fig. 2 is an elevation of a portion of the ladder from the front side. Fig. 3 is an elevation of one of the chain-wheel shafts, the upper one, in rear of the ladder. Fig. 4 is an enlarged sectional detail of the lower end of one of the adjustable guys or braces. Fig. 5 is an enlarged longitudinal section of a portion of the chain-ladder, and Fig. 6 is a cross-section on *x x* in Fig. 5.

Like letters refer to like parts in the several figures.

The nature of my invention relates to an extension-ladder mounted on a carriage for transportation, provided with appliances for extending and raising the same to any desired height on the front or side of a building, it being more especially designed for the use of fire-departments in cities and towns where the roofs of high structures are inaccessible with the ordinary ladders. The invention consists in a metallic chain of links connected together by rule-joints wound upon a drum, the edges of said links forming toothed racks, with which engages a set of spur-gears, driven by cranks and chain-wheels for compelling the ascent of the chain-ladder up the face of an inclined guide, and under guide-rollers, which keep the ladder in place, the whole being arranged to operate as more fully hereinafter set forth.

In the drawing, A represents the main frame of the carriage, which is supported at the rear end upon traction-wheels B, and at the front end by a single wheel, B', journaled in brackets *a* pendent from and moving in a circle-plate, *b*, under the frame A, to allow the vehicle to be turned in a very close compass. To the axle of the fore wheel is attached a draft-tongue, to which a team may be attached to draw the vehicle. Above the frame, in stand-

ards *c*, about the middle of its length, is journaled a drum, C, whose shaft has squared ends to receive cranks for winding upon said drum the metallic ladder, composed of the metallic plates D, having each two webs, *d*, projecting toward the front from their faces, the ends of the webs of one plate overlapping those of the next, to which they are pivoted by transverse bolts E running through the webs of the wide central and narrow side plates, thus connecting the links of the chains together, while they also form the rounds of the ladder. The joining ends of the links form rule-joints, which will not permit the ladder to bend back of a right line, although the links are free to roll inwardly, so that the ladder may be wound up on the drum. The inner edges of the plates which form the outer chains, and both edges of those of the middle chain, are cut to form toothed racks *e*. Behind the drum the lower end of a frame composed of two side pieces, F, connected by girts at top and bottom, is hinged to the frame A. The frame F is inclined at any desired angle with the main frame, being supported by an extension-brace, G, extending from its top girt to the rear end of the main frame, and forms a support and guide for the chain-ladder, which is kept from falling over by passing under the guide-rollers H H journaled across its face in brackets *f f* projecting from the side bars at their top and bottom. To the upper end of frame F is hinged a similar one, F', provided with a guide-roller, H', across its upper end, journaled in the brackets *f'*, and is supported by the braces G' extending from near the tops of its sides to the rear corners of the frame A. The braces G G' have a screw, *g*, threaded into their lower ends, actuated by a hand-wheel, *h*. To the bottom of the screw a turn-buckle, *i*, is secured in such a manner as to rotate axially thereon. The lower end of the turn-buckle has a groove turned in it to enable it to be slipped in the jaw of a gab-plate, *j*, secured to the frame A. When inserted therein the screws of the several braces are turned until the lower frame F is supported at the proper angle, while the top section of the frame is strained or guyed by its braces, so that it will stand firmly.

In moving to or from the scene of operations the braces G' are slackened and removed from



their gab-plates to allow the top section of the frame to be thrown forward to nearly a horizontal plane, in which it is supported by inserting the turn-buckles of its braces in gab-plates  $j'$  projecting from the front corners of the frame A. In suitable boxes, behind the lower part of the frame F, is journaled a shaft,  $k$ , and in similar boxes, near the upper end, another shaft,  $k'$ , is in like manner journaled. At each end of both shafts is keyed a chain-wheel, I, and endless chains J run over and around the wheels of both shafts, transmitting motion from the lower to the upper shaft. Each shaft also carries four spur-wheels, M, whose teeth mesh with the toothed racks of the chain-plates in raising or lowering the chain-ladder. On the ends of the shaft  $k$  are secured pinions K, with which mesh gears L on a counter-shaft,  $l$ , journaled in a pair of brackets behind the shaft  $k$ , its ends being squared to receive hand-crankes to rotate it, and, through the gears K L, the shaft  $k$ , which, in turn, through its spur-wheels M and those of the shaft  $k'$ , operates to raise and lower the chain-ladder.

In elevating the ladder, the chain of which it is composed is unwound from the drum, and, by the mechanism just described, is carried up the face of the guide-frames F F', and is sent up above the top of the latter as far as may be necessary, its rule-joints preventing it from bending much out of a right line. The top of the chain-ladder may be provided with hooks to engage with a window-sill or the cornice of a building, when slackened down a little, after passing up in contact therewith; or a fireman may mount to the top and make it

fast to the building before the ladder is subjected to the weight of a number of men and hose filled with water.

The link-plates of the chain-ladder are shorter at the lower end, and increase in length toward the upper end, so that when rolled on the drum they will lie compactly, and not waste space. As the stress upon the chain-ladder, when extended, is the greatest toward the bottom, that part is made heavier and stronger than the upper part, which is the least subject to strain.

The upper frame F' may also be provided with guy-ropes to make fast to lamp-posts, awning-posts, hitching-rings, or other convenient objects, to prevent any tendency of the ladder to sway laterally; but such guys are not deemed necessary under ordinary circumstances.

What I claim as my invention, and desire to secure by Letters Patent, is—

The construction and arrangement, with relation to the frame A mounted on wheels, of the drum C of the chain-ladder D, having rule-joints formed by passing the bolts E through the webs  $d$ ; the racks  $e$ , hinged guide-frame F F', the extension-braces G G', guide-rollers H H', shafts  $k k'$ , chain-wheels I, endless chains J, pinions K L, spur-wheels M, and counter-shaft  $l$ , [substantially in the manner and for the purpose set forth.

CHARLES H. WHITE.

Witnesses:

H. S. SPRAGUE,  
H. F. EBERTS.