

(No Model.)

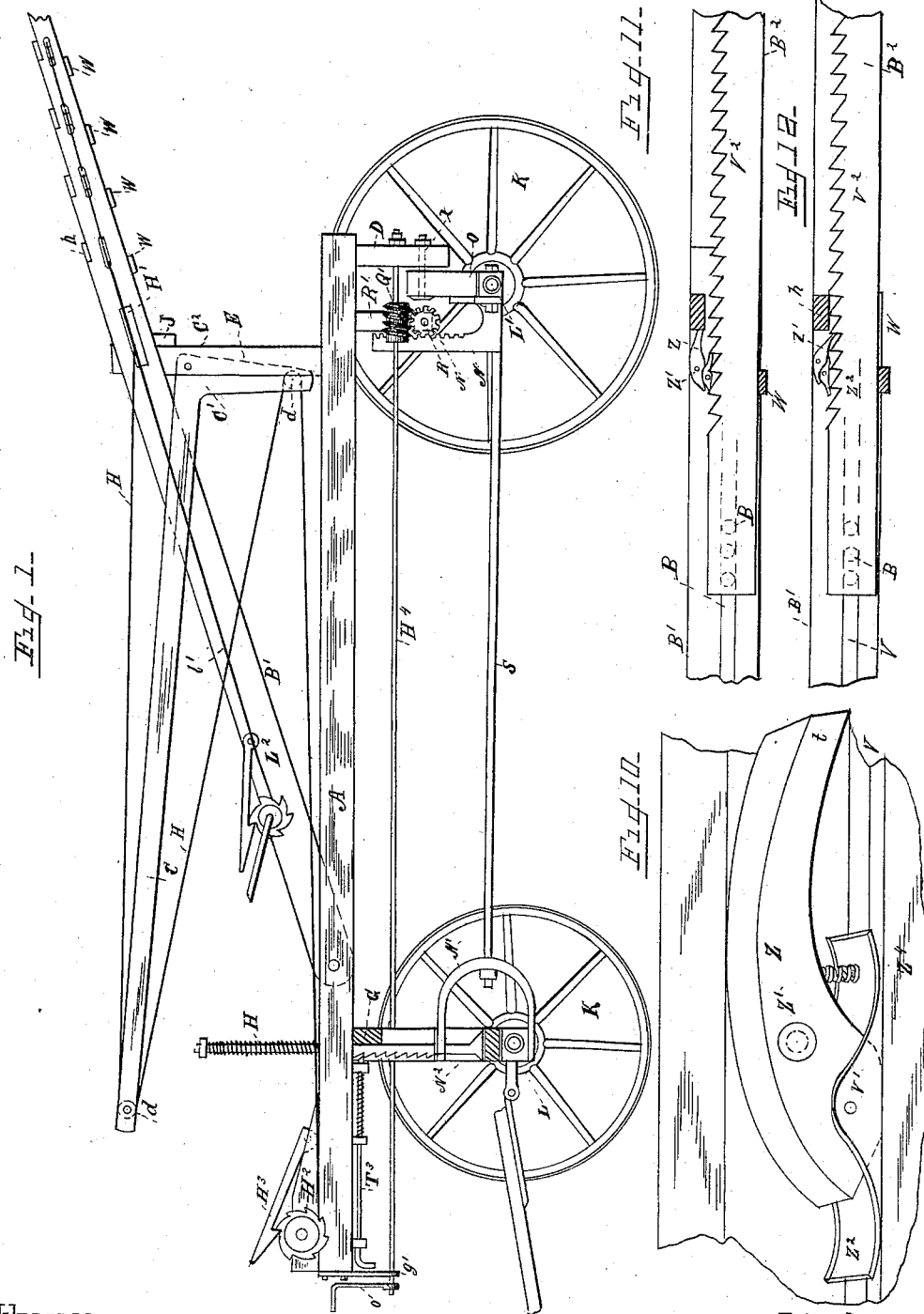
3 Sheets—Sheet 1.

F. L. HOWLAND.

TELESCOPIC LADDER AND TRUCK COMBINED.

No. 306,488.

Patented Oct. 14, 1884.



Witnesses

S. A. Paulschmidt,
J. M. Bates.

Inventor.

Per F. L. Howland
Thos. Weaver
Atty.

(No Model.)

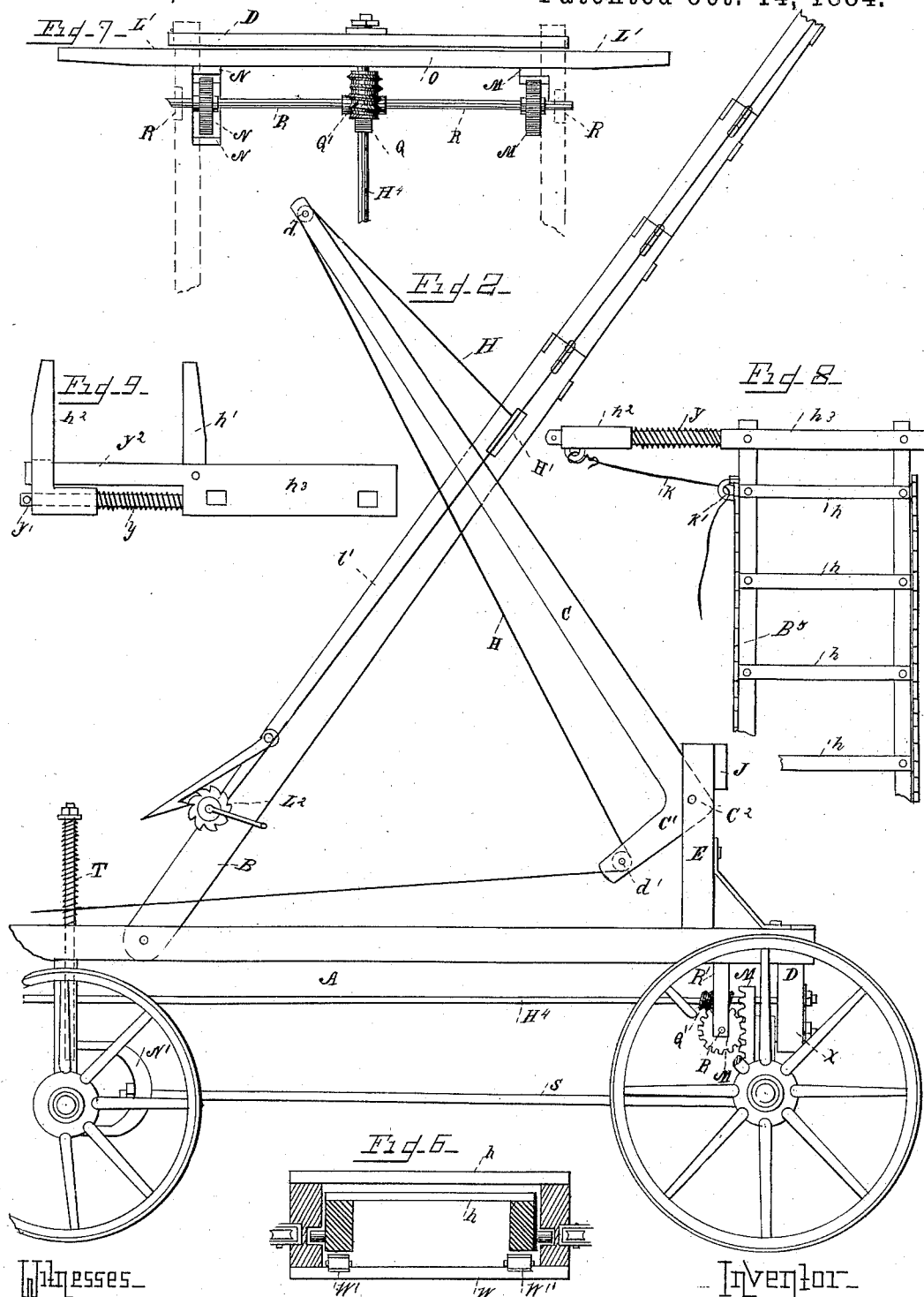
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F. L. HOWLAND.

TELESCOPIC LADDER AND TRUCK COMBINED.

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Patented Oct. 14, 1884.



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G. A. Tauberschwmidt,
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Inventor

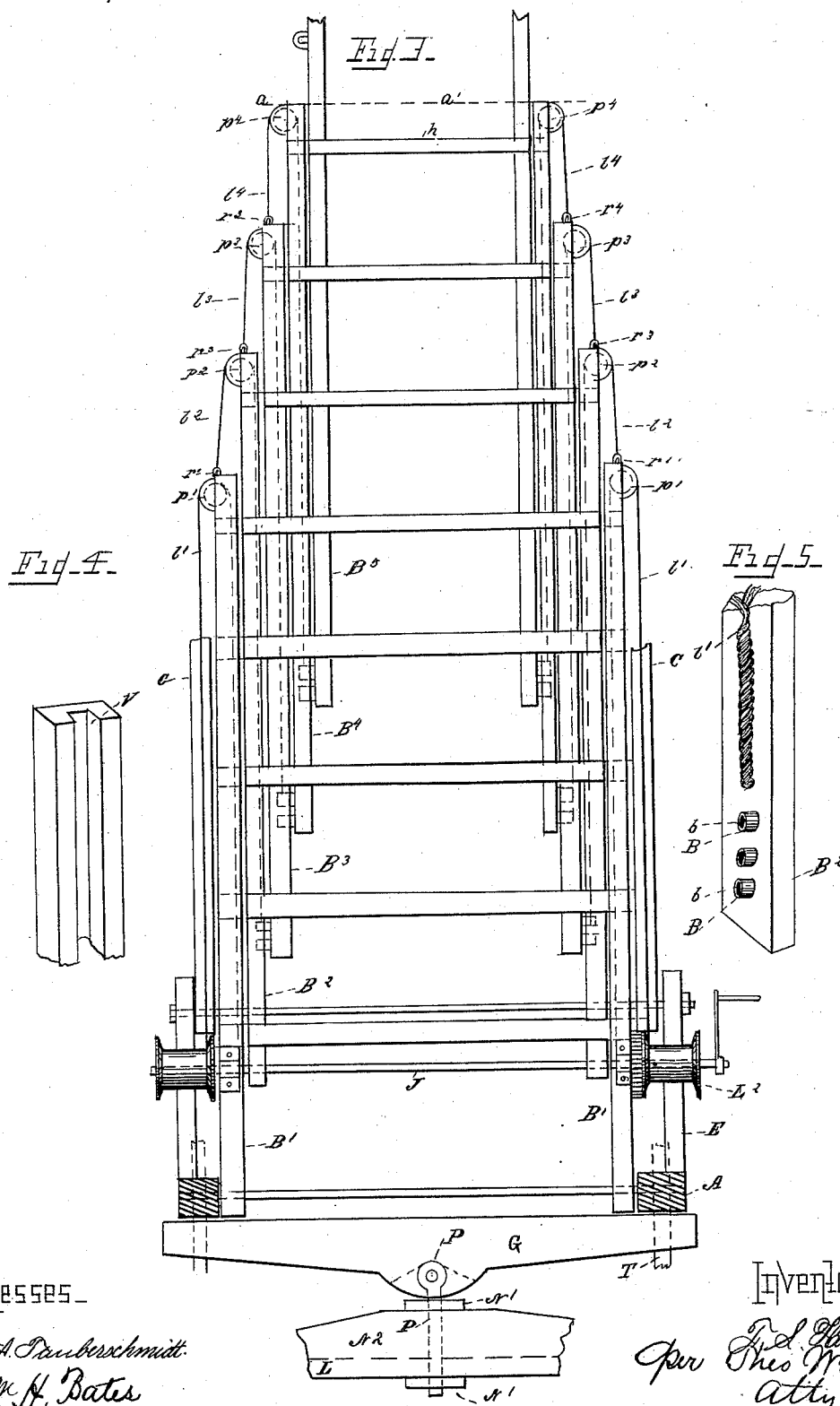
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UNITED STATES PATENT OFFICE.

FREDERICK L. HOWLAND, OF BLUE EARTH CITY, MINNESOTA.

TELESCOPIC LADDER AND TRUCK COMBINED.

SPECIFICATION forming part of Letters Patent No. 306,488, dated October 14, 1884.

Application filed June 12, 1884. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK L. HOWLAND, a citizen of the United States, residing at Blue Earth City, in the county of Faribault and State of Minnesota, have invented certain new and useful Improvements in a Telescopic Ladder and Truck Combined for Firemen and others; and I do hereby declare that the following, in connection with the accompanying drawings, is a full, clear, and accurate description of the invention.

In the accompanying drawings, Figure 1 represents a side elevation of ladders telescoped and mounted on truck. Fig. 2 represents a side elevation of the same with derricks erected and telescoped ladders in course of extension on truck. Fig. 3 represents a front view of same ladders unextended, but erected by lay-down derricks, which latter are shown broken away and truck-platform adjusted level. Fig. 4 represents a perspective view of upper end of ladder-beam. Fig. 5 represents a perspective view of lower part of ladder-beam with rope and guiding-studs thereon. Fig. 6 represents a sectional top view of two sections of telescoped ladder, taken at indicated line *a a'*, Fig. 3. Fig. 7 represents plan or top view of rear portion of platform, hind truck, and means for leveling platform on uneven ground. Fig. 8 represents a front view of attaching-clamp on top of top section of ladder. Fig. 9 is a view of said clamp detached. Fig. 10 is a perspective view of automatic spring-pawl and shoe on inside of ladder-section. Figs. 11 and 12 are front views of automatic spring-pawl and shoe mounted on ladder-beam and adjusted to positions, respectively, of disengagement and of engagement relative to the notched ladder-beam next to it.

The object of my telescopic ladder and truck is to provide a serviceable article for use of firemen, painters, builders, fruit-pickers, and others, and adapted to be self-supporting, as for elevating hose, to be stood against a wall or erected parallel therewith, and that one person may be able to erect and use a very extensive ladder whether on level or on uneven ground. The novel and useful features thereof are, first, a carriage having its rear truck provided with toothed racks, extended vertically from its axle or bed-piece, to which they

are fixedly attached, a rocker or transverse support pivoted to said bed-piece at the middle, and holding on its ends the platform-sills, which latter are provided with pendent arms, in which are the bearings on the opposite sides of the said truck a little in front of hind axle for a transverse shaft, whereby the adjustment of the platform is effected at its rear end, said shaft being provided with pinions adapted to engage said racks, and by their opposite travel cant the platform, bringing it level with horizon, said pinions being driven by worm-wheel on same shaft, which wheel is driven by worm on a long shaft supported longitudinally below said platform, and extended through bolster of front truck, and provided with crank for operating it in front of carriage; second, in combination with said means for leveling hind portion of platform, set-bolts inserted through front portion of platform and bolster, and spring-catches for setting said bolts as props on front axle, bolster and axle being hinged together; third, the combination of sills of platform, provided with a post on each arranged opposite each other, equally distant from and in vicinity of rear axle, with two similar lay-down derricks, composed of mast and arm on front side of mast at base, each derrick being pivoted to inside of one of said posts transversely in line with each other, they being stopped when raised to vertical position, and adapted to lay down only frontward, and with ropes applied to pulleys on the free ends of said masts and arms, and operated by windlass; fourth, the combination of said derricks with telescopic ladder, having its base-section pivoted to said sills near their front ends, and connected by ropes attached thereto to said windlass by way of said derricks, so that as the ropes are wound up the derricks and said ladder advance to erect positions, successively; fifth, the combination of a series of telescopic ladder-sections arranged to slide within each other and be guided by studs and anti-friction rollers on the outside of the beams of each lesser section, adapted to traverse grooves in the insides of the beams of the next larger or lower section, with ropes attached to the lower part of beams of lesser section, carried up in said grooves above said studs, and passed over pulleys on summits of next lower section, and connected for opera-

tion with operating-windlass, whereby all the sections become equally and simultaneously extended or let down; sixth, in combination with beams at top of telescopic ladder, an attaching-clamp therefor, consisting of cross-batten fastened removably by mortises and tenons to said beams, a fixed jaw on said batten, and a spring-jaw on same, guided and operated to co-operate with said fixed jaw, to fasten onto window, and thereby steady the ladder when erected in line with wall of a building, as for painting it, and that ladder may be safe as a fire-escape, its side next the building being guarded thereby against accidents arising from descending hastily on ladder.

By reference to the accompanying drawings, whereon similar letters denote like parts, letters K K denote the carriage-wheels, and L L the front and the hind carriage-axles, respectively.

G is the bolster, pivoted or hinged to king-bolt P, and thereby connected to bed-piece N², axle L, and the half-circle N' of reach S, as shown in Fig. 3.

O denotes bed-piece on axle L'. D is the rocker, pivoted at x to said bed-piece, and supporting on it the sills A A of platform, which are parallel, and rest at their front ends on the bolster G, and with said rocker and bolster attached thereto constitute the platform. B' B' are the beams of major section of ladder pivoted to said sills, as shown, and having telescoped between them the other sections, B² B² B³ B³, &c., of ladders. On said sills, directly in front of the hind axle, are fixedly set the erect posts E E, transversely in line with each other and of equal height. To said posts are pivoted or journaled the similar lay-down derricks, C C', each consisting of a mast, C, and arm C', solidly joined together in L form reversed, swinging about the axis C² simultaneously, and having the ladder-beams B' B', arranged to rise and fall close to insides of the masts C.

The letters d d' denote pulleys on free ends of the masts C, and of the arms C', respectively. Ropes, chains, or cables H, attached at their rear ends to beams B' B' at blocks H', pass over the grooved pulleys d d', and when pulled in direction of the arrows by windlass H² hoist said masts C C and erect the ladders, all telescoped into the base-section B' B'. On even ground the ladders may then be kept erect by a catch, H³, and the extension of the same effected by drums or windlasses L², both on the same shaft J, run upon the outsides, oppositely of the ladder-beams, and journaled through or at the lowest section, B' B', and having attached to said drums ropes, chains, or cables l', whose other ends are attached to the lower ends of ladder-section B², and operating to extend all the ladder-sections in connection with other ropes, l' l', as hereinafter set forth. On uneven ground, however, before extending the ladder-sections,

the truck must be adjusted to bring the platform on it level on top, or horizontal. For this purpose the rear truck is provided with a canting-jack device consisting of a transverse shaft, R, journaled in pendants R' on sills A A, to be parallel with axle L', a little in front of and above it, which shaft has on it, next in from said sills, pinions m n, adapted to gear with teeth of racks M N, respectively, fixedly attached to axle or bed-piece thereon in such position that one of said racks, M, may stand vertically aligned with rear step of pinion m, and the other, N, aligned with front step or path of pinion n, that the forward travel of said pinions operates to cant said platform in one direction, and the reverse travel of the same cants it in the opposite direction. For imparting to said shaft R and the pinions m n thereon rotary movement in either direction and stopping it at any desired point, the worm-wheel Q is attached to said shaft near its middle, and the worm Q' on shaft H⁴ is adapted to gear with said wheel and drive it, and therefore shaft R with the pinions m n thereon. Shaft H⁴ is arranged longitudinally under the platform A A D G, having its bearing in the rocking pieces D G near their centers of motion. The hanger G' supports the front end of said shaft near the actuating-crank O thereon.

For sustaining the bolster G horizontally aligned when the platform A A D G is adjusted level at its rear end by said jack device, it is under blocked or stayed by the stop-bolts T, inserted through sills and bolster, as shown, and kept set as props therefor by the spring-catches T², engaged by notches on said bolts. The ladder-sections are made wide enough relatively to let the next lesser section be inserted between the beams of the next larger one. All the sections, except the base-section B' B', have on their beams below on the exterior sides several studs, b', provided with the anti-friction rollers B. The inner sides of all the ladder-beams, except those of the top section, are grooved at V, into which grooves said rollers fit loosely, and which they freely traverse in extending and in telescoping the sections of ladder. Said grooves are near middle of cross-section of beams, behind the steps or rounds h on the same.

Across the rear edges of ladder-beams, near their upper ends, are attached thereto cross-bars W, one on each ladder-section, which cross-bars on their inner sides are provided with anti-friction rollers W' in position to support thereon the upper portion of each of the upper ladder-sections in course of extension. Said ladder-beams B' B² B³ B⁴ have in transverse slots or cuts in their summits grooved pulleys p' p² p³ p⁴, respectively, one in top of each beam. Over the slots or cuts containing the said pulleys are attached clevises or bow-form irons, whose tangs are fastened onto the wood to protect the same about said cuts, as well as to constitute solid bearings for the

bolts through them, serving as journal-bearings of said pulleys. The ladder-sections are similarly provided on their opposite sides with said studs *b* and anti-friction rollers B, about three in a group on each, near lower end of beam, and on same sides, directly above said rollers, are fastened to said beams the ropes *l'*, &c., as shown, which are fastened at their other ends to clevises, as stated, on the summits of alternately lower ladder-sections of the series, so that section B² is coupled by ropes on its opposite sides to clevises on summits of section B¹, section B⁴ is likewise coupled to clevises *r*² on section B³, section B⁵ is likewise coupled to clevises *r*³ on section B⁴, and section B⁶ is coupled directly to windlasses I².

The operation of said parts is as follows: When ropes *l'* are drawn, section B² is raised, said ropes being upheld on pulleys *p'* in summits of section B¹. The ascent of section B² takes up ropes *l'*, supported on pulleys *p*² in its summits, which causes section B³ to be raised. The ascent of section B³ takes up ropes *l'*, supported on pulleys *p*³ in its summits, which causes section B⁴ to be raised. The ascent of section B⁴ takes up ropes *l'*, supported on pulleys *p*⁴ in its summits, which causes section B⁵ to be raised. The series may be extended likewise indefinitely, and each and every section will advance simultaneously, so that when the lower one is extended partly or fully the upper sections will be extended similarly. The summits of the upper section, B⁶, are without pulleys, and are adapted as tenons, to which is fitted removably a scantling, *h*², transversely extended beyond the side of ladder, having on it a fixed clutch or jaw, *h'*, and farther out a movable jaw, *h*², actuated by spiral spring *y* on guide *y'* to open said jaw, whose shank is coupled to rope *k*, which is passed through bow *k'*, and from thence extended to the ground, that by drawing said rope while on the ground said jaws may be closed to take hold of sill of window or other object in elevated position, and thereby steady top of ladder to keep it from swaying, and for greater safety in mounting and dismounting it.

The extended sections of ladder are liable to settle when weight is on them, owing to the ropes *l'*, &c., stretching. For avoiding said tendency I sometimes provide the beams of the upper ladder-sections with teeth or notches V², as shown in Figs. 11 and 12, and provide the inside of the adjacent beam with a spring-pawl, *z*, pivoted to it at *z'*, having its nosing *t* adapted to catch in said notches, when ladder rests on an object farther up than said pawl, thereby cocking the upper sections of ladder home, by its gravity, and securing by contact with it, by means of the shoe or slider *z*² *z*³, pivoted to foot or heel of pawl at V', the forward movement of said nosing. The manner of said operation may be stated thus: The beam B² is of less thickness than the space between the upper round or step, *h*, and the cross-bar W and foot of

said beam are kept in place by the rollers B traversing the slot V. The upper end of ladder-section is therefore permitted to cock to a limited extent. A spiral spring, *z*⁴, inserted between said shoe *z*² *z*³ and said pawl *z*, in front of the pivot *z'*, causes the nosing *t* of the pawl to lift when ladder B² B³ cocks down at top. The rear end, *z*², of said shoe being then relieved of pressure, automatically adjusts itself to let the said nosing rise and come free of the notches V²; but when said beams B² bear against the rounds *h*, the pawl *z*, being then pressed at its heel, the energy of the spring *z*⁴ is overcome and the nosing *t* engages the notches V². For ordinary use, good rope or wire cord answers well enough, and said automatic pawls and notches may then be omitted.

When the ladder-sections are extended or are in course of extension, they may be erected steeper, or lowered by turning forward or back windlass H².

The brace J limits the rise of the derricks C C'.

I claim—

1. The combination of the sills A A with rocker D and bolster G, pivoted, respectively, at X and P' axially in line for hinging platform longitudinally to running-gear of carriage, and with means for canting and setting the platform level, substantially as and for the purposes set forth.

2. The combination of the platform A A D G, hinged longitudinally to carriage running-gear, with the canting-jack device employing the vertical racks M N, fixedly attached to hind truck, and the worm-gear H⁴ Q', communicating with the transversely-supported shaft R by means of worm-wheel Q thereon, and hence communicating with said racks by means of the pinions *m n* on same shaft R, engaging said racks right and left, substantially as and for the purposes set forth.

3. The combination of the platform A A D G, adjustably mounted on running-gear of carriage, with beams B' B' of base-section of ladder, pivoted to insides of the sills A A near bolster G, and with the lay-down derricks C C', pivoted to said sills directly in front of hind axle, L, and connected with said beams by ropes or cables H, applied to said derricks over grooved pulleys *d d'* thereon, substantially as and for the purposes set forth.

4. The combination of the sidewise-canting platform A A D G, provided with means for jacking it and setting it firmly level, with beams B' B', of base-section of telescopic ladder pivoted thereto, and with the derrick C C', pivoted to the same farther back, and with ropes H, attached to said beams and to said derricks, and operated from drums or windlass H², provided with stop H³, all co-operating for erecting ladder, substantially as set forth.

5. The combination of the carriage having its trucks united by reach S and half-circle N', the latter applied to embrace the bed-piece N² and axle L, with platform A A D G, hinged to

bed-piece O and to the head of king-bolt P, the latter interlocking bolster G and parts embraced by said half-circle, with a telescopic or extension ladder hinged to the sills A A of said platform or to extensions thereof, and with derricks C C', adapted by means of ropes to erect the ladder, substantially as and for the purposes set forth.

6. The combination of a series of ladder-sections, B' B² B³, &c., telescoped together, beams inside of beams and guided by anti-friction rollers B on studs b in grooves V therein, and by rear cross-braces, W, provided with rollers W' thereon and duly spaced from the steps h, and operated by pairs of ropes l' l² l³, &c., from windlass or drums L², substantially as and for the purposes set forth.

7. The combination of ladder-sections B' B² B³, &c., provided with clevises r', &c., pulleys p', &c., at summits of their beams, and guided by suitable means to move correctly upon each other, as set forth, with the actuating-ropes l', &c., attached to lower part of the extensible sections, and passed over said pulleys and attached to alternate clevises, and to the drums L², all arranged for erection and extension on a carriage-platform, A A D G, substantially as set forth.

8. In combination with uppermost portion of a ladder, a scantling, h³, applied by mortises therein to the tops of the beams as tenons, and provided with fixed jaw h' and guides y' y², the adjustable jaw h², loosely slid onto the outer ends of said guides and retained thereon by a pin, the spiral spring y, applied around guide y' and operating to thrust jaw h² open, and a rope, k, or other appliance, attached to the shank of the latter for closing it by draft while operator is on the ground, substantially as and for the purpose set forth.

9. In an extension-ladder, the combination of a notched ladder-beam, B², with pawl z, adapted to catch in the notches V², and pivoted to side of beam B' of next lower section for bracing the sections after extension, and a shoe, z² z³, pivoted to heel end of said pawl, and adapted by spiral spring z⁴, inserted between the end z³ and said pawl for disengaging the nosing t from said notches V² when the beam B² is cocked back to its limit of play between bars h and W, substantially as and for purpose set forth.

FREDERICK L. HOWLAND.

Witnesses:

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