3 Sheets--Sheet 1.

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## Firemen's-Ladder.

No. 168,947. Patented Oct. 19, 1875.

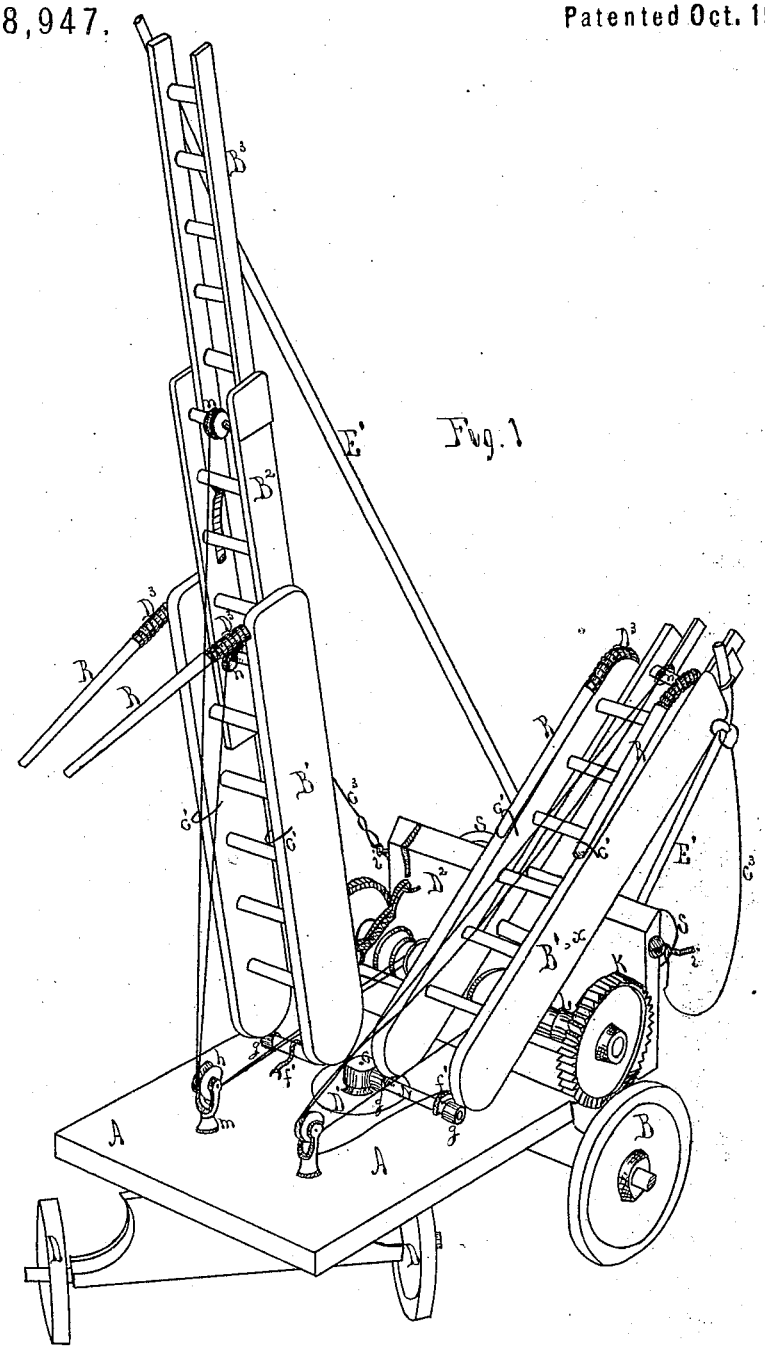

Fig. 1

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Fig. 2

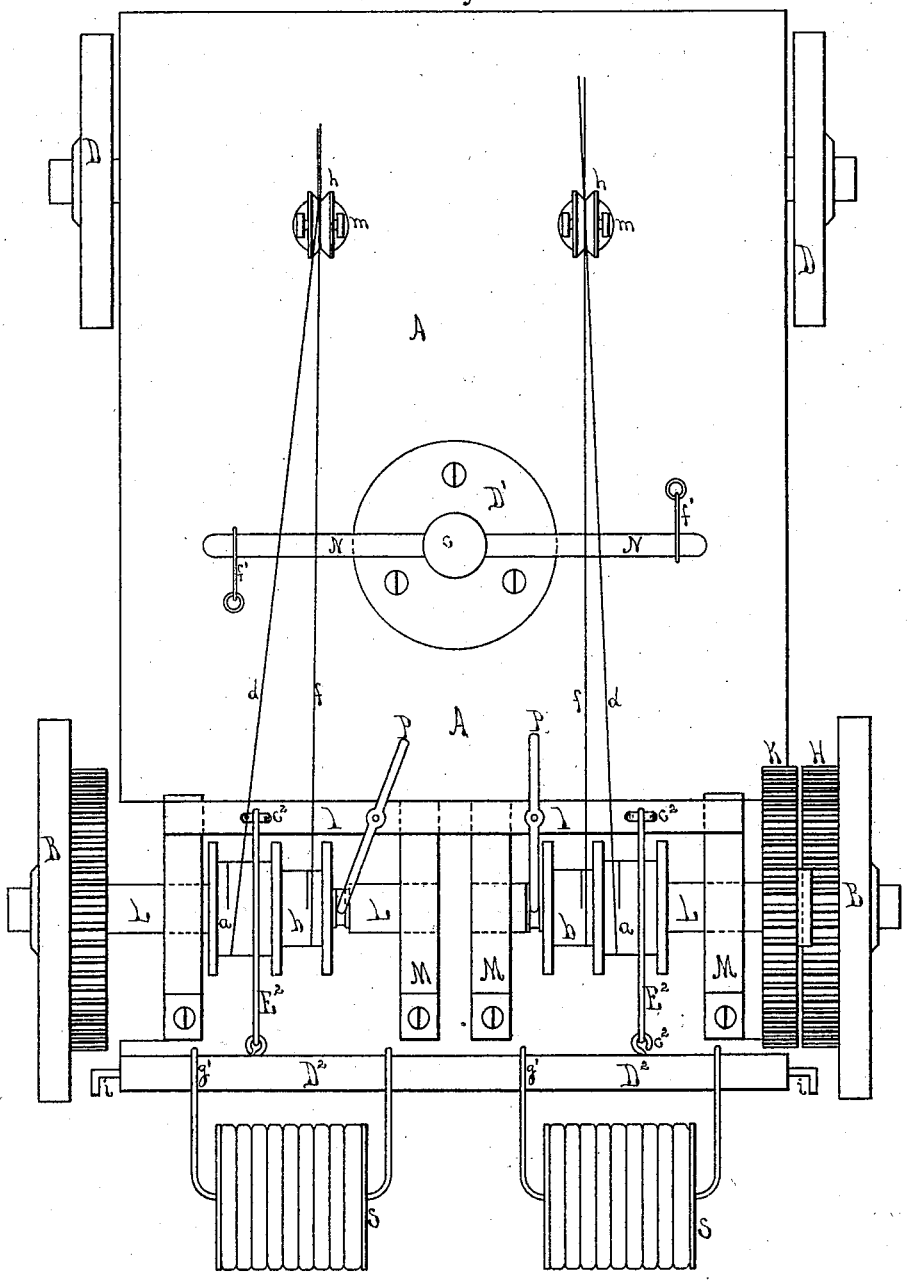


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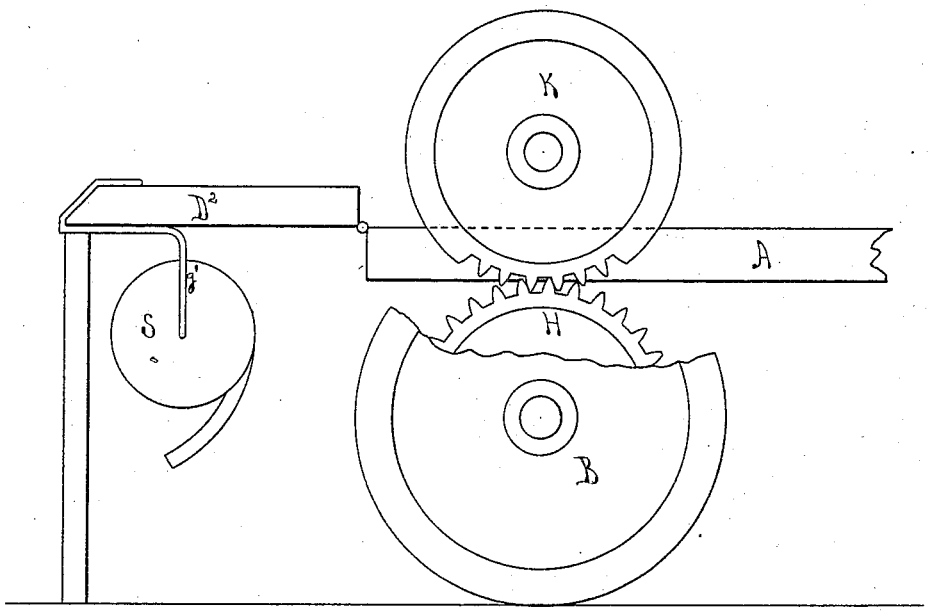
Fig. 3

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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN FIREMEN'S LADDERS.

Specification forming part of Letters Patent No. **168,947**, dated October 19, 1875; application filed June 3, 1875.

*To all whom it may concern:*

Be it known that I, CHARLES WARD, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Firemen's Ladder and Hose-Carriage, of which the following is a specification, in connection with the accompanying drawings, forming part thereof, and in which drawings—

Figure 1 represents a perspective elevation of my apparatus with one of the ladders extended, as when in use, and with the other ladder in its most compact form, as for transportation. Fig. 2 represents a plan or top view of the ladder and hose-carriage with the ladders removed. Fig. 3 represents a side elevation of the rear part of the carriage with the rear hinged tail-board lowered, as when running off hose horizontally from the reels.

This invention consists of certain new and useful improvements in firemen's ladder and hose-carriages, in certain of the connected and connecting mechanisms, and in the combinations thereof, and forming or constituting the apparatus. All the parts or elements, and their combinations, and the construction and mode of operation, are hereinafter more fully described.

In the said drawings, A represents the body or floor of the carriage, mounted on rear wheels B and forward wheels $D^6$ in any convenient manner for moving and handling the carriage and the apparatus. To the inner edge of each rear wheel B a spur-gear, H, is securely fastened, and above each gear H, and meshing into each said gear, is a second spur-gear, K, secured to the end of a drum-shaft, L, supported in fixed bearings M on the rear end of the floor A. These two separate drum-shafts are each provided with a larger and a smaller hoisting-drum, *a* and *b*, around which ropes or cords *d* and *f* are wound, to hoist or extend the ladders, each cord passing from its drum forward, and both around a wheel, *h*, arranged in a stand, *m*, rising from the floor A near the forward end thereof. From each wheel *h* the two cords *d* and *f* pass upward to, and connect with, the extension-ladders. These extension-ladders are constructed in two or more common sliding sections. The lower section $B^1$ of each ladder has upon the lower end of each side thereof a suitable metal eye, *g*, by which to loosely connect each ladder to a swivel cross-bar, N, so as to swing the ladders to any desired position—that is, crosswise or lengthwise with the carriage, or at an angle between these two positions. This cross-bar N projects from opposite sides of the head *c* of a spindle loosely seated in a step, $D^1$, at about the center of the floor A, and near each end of the cross-bar is a hasp or fastening-hook, *f'*, to hold the set cross-bar and the connected ladder in position. The eyes *g* on the lower end of each lower section $B^1$ are slid onto each projection of the cross-bar, where they are movable to allow the ladders to be elevated or lowered, substantially as shown in Fig. 1. Each drum-shaft L is movable endwise in its bearings, so as to throw the teeth of their gears K into or out of contact with the wheel-gears H, and this is done by a lever, P, or other suitable device, arranged upon a beam or bar, I, a little forward of, and taking hold of, the drum-shaft. Each section of the ladder or ladders, except the upper section $B^3$, has a roll or wheel, *n*, on its top round to carry the hoisting-cords, and make them run easier and with less friction; and each lower section $B^1$ has hinge or spring connected struts R at the upper end, to set against the wall of building, and hold or support the top end of the ladder. When not in use these struts are swung downward, and their ends secured, by a link, $c^1$, to the edge of the ladder, all as seen in Fig. 1. The cord *d* runs from the larger drum *a* round the wheel *h*, and upward over the wheel *n* on the top round of the section $B^2$ of the ladder, and downward, where it is fastened to one of the lower rounds of the upper section $B^3$. The cord *f* runs from the smaller drum *b* round the wheel *h*, and upward over the wheel *n'* on the top round of the lower section $B^1$, and downward, where it is fastened to one of the lower rounds of the section $B^2$, each cord and drum operating to hoist its connected ladder, each of which is carried or transported in the position of the ladder $B^{1\times}$ in Fig. 1, and resting on the top edge of the tail-board $D^2$.

To elevate and extend either of the ladders in this last-named position the drum-shaft on the same side of the carriage is pushed endwise and outward by the lever P sufficient to

mesh the teeth of the gear K into the teeth of the gear H; and then I generally move the carriage forward or backward, when the weight of the carriage and the apparatus upon the rear wheel, by its motion, causes its inner gear H to turn the gear K and the drum-shaft and drums, and these wind up the cords, the smaller drum first tightening the cord *f*, and by this cord drawing the top end of the section $B^1$ and the closed other ladders upward to the position of the ladder $B^1$. (Seen in Fig. 1.) In this position both of the cords become tightened, or nearly so, and, continuing the motion of the carriage and the gears and drums, the larger drum *a*, carrying and winding up the cord *d*, connected to the top section $B^3$, moves this section upward about twice as fast as the section $B^2$ is moved by the cord *f* and the smaller drum *b;* and by this means both or all the movable sliding sections of the ladder are extended, and reach their highest point at the same time. Before hoisting or extending the ladders a joint or line of hose, $E^1$, may be attached to the top or other portion of the upper section $B^3$, or to either of the other sections, and by this means the hose end and its pipe carried up with the ladder, the hose being wound upon a reel, S, connected to or carried on the tail-board $D^2$ of the carriage. Previous to elevating the ladders, or afterward, if wanted for supports, the struts R are released from their links and thrown out by their springs $D^3$, to support the top of the ladder by bracing against a wall in their reach. To close or slide the sections of the ladder together, the gear K is disconnected from the gear H by pushing in the drum-shaft and its gear to the position of the right-hand drum-shaft L, (seen in Fig. 2,) where the gear H is seen outside of the gear K, when the sections of the ladder are easily hauled down and closed together, the cords slackening by the turning back of the liberated drum-shaft and drums.

The tail-board $D^2$, before referred to, is hinged to the rear end of the carriage or floor A, and is held in a vertical position by hooks $E^2$ and eyes $c^2$ in the beam I, and in the tail-board, to the top edge of which I apply hose-reels S, to be supplied with hose for elevating with the ladders, and for conveying water to the tops of burning buildings or those in danger of conflagrations, or to be used in a line of hose upon the ground; and when thus used the tail-board may be let down, as shown in Fig. 3, or the hose may be run off from the reels when the tail-board is in its vertical position.

The hose-reels may be removably connected to the tail-board by hooks *g'*, and then they may be disconnected at pleasure, if preferred.

When the ladders are elevated, and before and while extending them, and after they are extended, they are held in position one way by cords $c^3$, connected to the top of the lower section $B^1$, and to hooks *i* in the ends of the tail-board.

In constructing the extension-ladders and the hoisting-drums there must be a regular proportion of the diameters of the two drums, so that when the ladders are elevated by their cords *f* and their drums *b*, preparatory to hoisting or extending them, both cords shall become tightened, and both or all the movable sliding ladders will be carried up at the same time, and the upper section will travel upward about twice as fast as the section next below it. By this means I am able to hoist or extend the ladders in about half the time it would require to hoist each section separately; and, besides this, the hoisting apparatus—viz., the two proportionate drums *a* and *b*, and their connecting and operating mechanisms, the gears K, and cords *d* and *f*—constitute a very simple hoisting mechanism.

I claim as my invention—

1. The swivel cross-bar N, with its head *c*, and its spindle and step D, constructed as shown and described, in combination with the end eyes *g* and the ladder, and carrying and supporting the latter by its lower ends, substantially as described.

2. In combination with the extension-ladders, the elevating and hoisting mechanism, consisting of the larger and smaller proportionate drums *a* and *b*, the gears K and H, cords *d* and *f*, wheels *h*, and rolls *n*, substantially as described.

3. Hoisting-drums *a* and *b*, and their shaft and gears K, and movable endwise to connect with the driving-gears H, and to disconnect therefrom, substantially as described, in combination with the rear wheels B, and with the extension-ladders, by cords *d* and *f*, and wheels *h* and *n*, or connecting mechanisms.

4. The spring-connected struts K, in combination with the section $B^1$ of the ladder, substantially as described.

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