

UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN EXTENSION-LADDERS.

Specification forming part of Letters Patent No. 202,169, dated April 9, 1878; application filed October 29, 1877.

To all whom it may concern:

Be it known that I, DANIEL D. HAYES, of the city and county of San Francisco, in the State of California, have made and invented certain new and useful Improvements in Firemen's Extension-Ladder and Truck, which invention is fully set forth in the following specification and accompanying drawings.

In the said drawings, Figure 1 is a perspective view of my invention as applied to an extension fire-ladder truck. Fig. 2 is a top view, in detail, of the turn-table and the mechanism for raising and holding the ladder to an inclined or a perpendicular position. Fig. 3 is a side elevation, in section, of the end of the truck shown in Fig. 2. Fig. 4 is a detail view of the device for holding the extension-ladders against any backward motion.

The object of my invention is to provide an improved means for raising, and lowering, and holding in any desired position the ladders of extension-ladder trucks; and it consists, first, in the application of the operative mechanism or power to the main ladder of the truck upon both sides of its trunnions or center of motion, whereby the weight of the ladder is the better received and sustained by the mechanism, and the ladder is securely held in any inclined or in a perpendicular position, and with less strain upon its axis; second, in the construction and application of a device for holding the small extension-ladders at any point as they are raised, and preventing any backward movement, all of which will be more fully set forth hereinafter.

The truck A A' (shown in Fig. 1 of the drawing, is made of any suitable form, and has the turn-table B secured upon it at one end. Upon this turn-table is mounted the main ladder C. This ladder is pivoted at *c c* in the standards or frame D D, and upon it is set the extension-ladder H'.

E F G H constitute the mechanism for raising and lowering the main ladder and holding it in any desired position, which will be understood by reference to Figs. 2 and 3 of the drawing.

The turn-table is composed of two parts—a stationary base, *b*, fixed to the truck, and a ring, *b' b''*, moving upon this fixed part, upon

which it turns freely, while at the same time it is held to its place and is prevented from being separated therefrom by means of the construction shown in Fig. 3, where the fixed part of the turn-table B' has a flange that works in a groove in the movable portion.

The main ladder turns upon the trunnions or axis *c c*, and is supported upon this pivot in the standard D D, secured upon the upper part of the turn-table. Its movements are produced by means of the screw G and the traveling nut E, the former fixed upon the ring *b'*, and the nut being held within the arms or braces F F, secured to the ladder. The nut E is provided with journals *e e*, which fit in sockets in the arms F F, so that as the nut is caused to travel upon the screw it produces a rotating movement of the ladder upon its trunnions by virtue of the arms that extend in a radial manner from the nut E up to the ladder, and are secured to it upon both sides of the center *c*, one arm being pivoted, at *f*, to the end of the ladder, and the other being secured to the under side at *f'*, as shown in Fig. 2. This construction causes the nut to travel in the arc of a circle, whose center is at *c*, and for this reason the screw G is pivoted, at *g*, in the bearings H H, so that the opposite or free end of the screw can rise and fall in the arc of a circle, and thus allow for the movement of the traveling nut E, which, as it moves upon the screw G, also has a motion either forward or back in a curved path.

The oscillating movement of the screw G is produced by having the box *g* mounted on the centers *h h* within the bearings H H. This construction allows the nut E to retain at all times a proper relation with its screw, and thus work smoothly without binding.

The action of the nut E and the arms F F, by which the power is brought upon both sides of the center of motion *c* of the ladder, tends to distribute the weight of the ladder sustained by the working parts in raising or lowering it by supporting that portion of the ladder on the longer side of the center *c*, and relieving the trunnions or axis at that point. By these means the ladder is also held firmly in any desired position, whether inclined or perpendicular.

The screw G has a square or angular head, upon which the crank or handle L is placed to operate the screw.

The end of the extension-ladder H' is provided with the pawl I, for holding it from moving back when it is elevated. The pawl is pivoted, at *i*, to the ladder, and has a suitably curved or notched end to engage with the round of the main ladder C as the extension-ladder is run up by the cord or chain *l l*, and to hold it from any backward movement. When this pawl is not in use—as, for instance, when the small ladder is being drawn down—the position of the pivot *i* allows the pawl to be thrown back, so that the recess or notch *k* shall engage with the round of the small ladder, and the pawl be held back out of the way.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent as being new, is—

1. In combination with a fire-ladder truck having a turn-table, B, and pivoted ladder C, the mechanism for raising, and lowering, and holding the said ladder in any position, composed of the parts E F G *g* H, by which the power employed to operate it is applied to the

ladder on both sides of its axis or center of motion, substantially as described, for the purpose set forth.

2. In combination, the screw-rod G, held in a pivoted bearing, *g*, at one end between the brackets H H, and being free at the other end to move in the arc of a circle, the nut E, and the rigid radial arms F F, secured to the ladder-frame at the points *f f' f''*, which are on both sides of the center of motion or axis of the ladder, the whole arranged substantially as and for the purpose set forth.

3. The pawl I on the end of the extension-ladders of a fire-truck, pivoted at *i*, and provided with a suitably-curved end, *j*, and a notch or depression, *k*, for holding said pawl out of play, constructed and applied to operate as and for the purpose set forth.

In testimony that I claim the foregoing I have hereunto set my hand and seal this 4th day of October, 1877.

DANIEL D. HAYES. [L. s.]

Witnesses:

C. W. M. SMITH,
WILLIAM HARNEY.