

LaF. TWITCHELL & J. A. CLARK.  
Fire-Escape Ladder.

No. 212,768.

Patented Feb. 25, 1879.

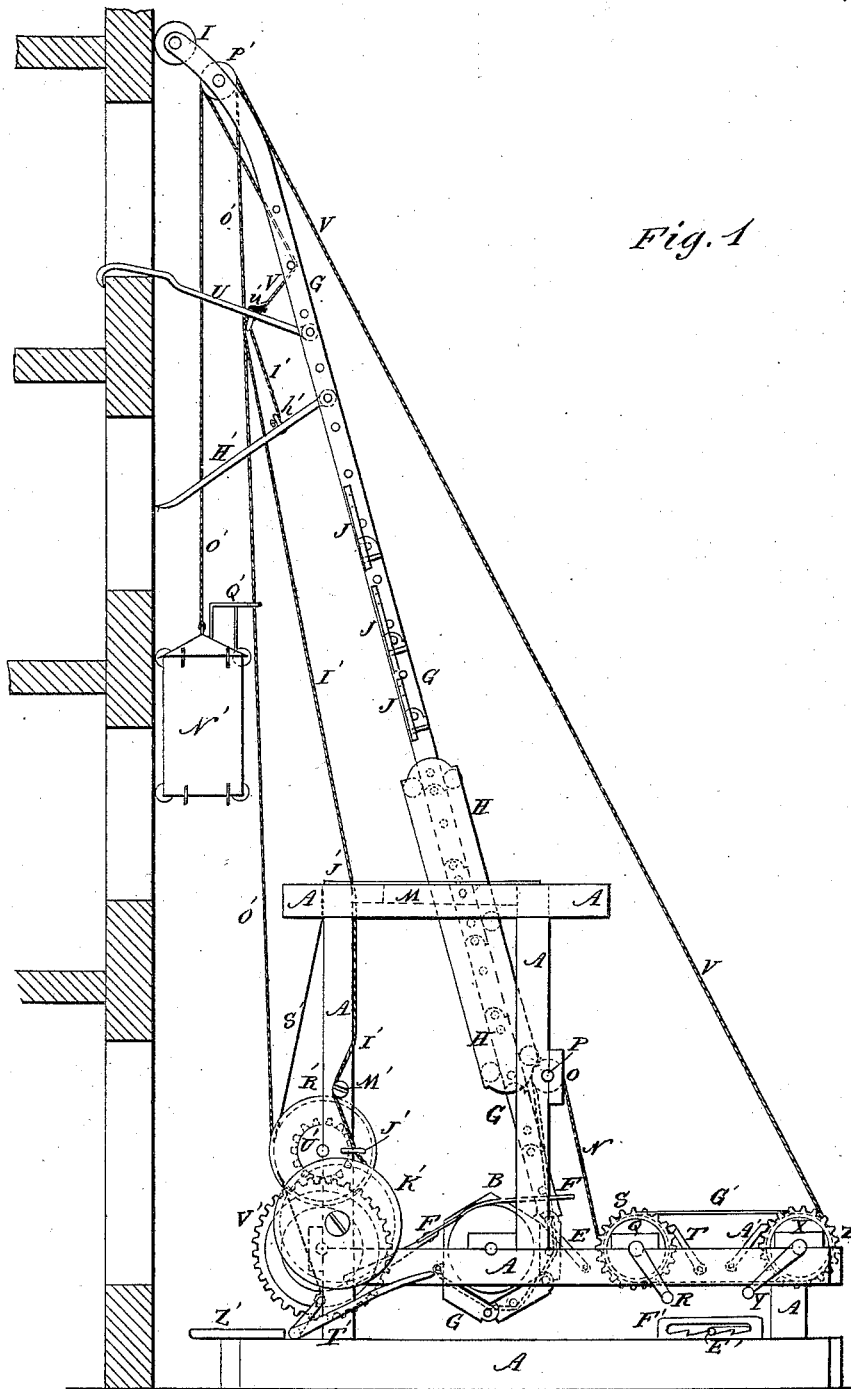


Fig. 1

WITNESSES:

*C. Neveux*  
*C. Sedgwick*

INVENTOR:

*LaF. Twitchell*  
*J. A. Clark*  
BY *Munroe*  
ATTORNEYS.

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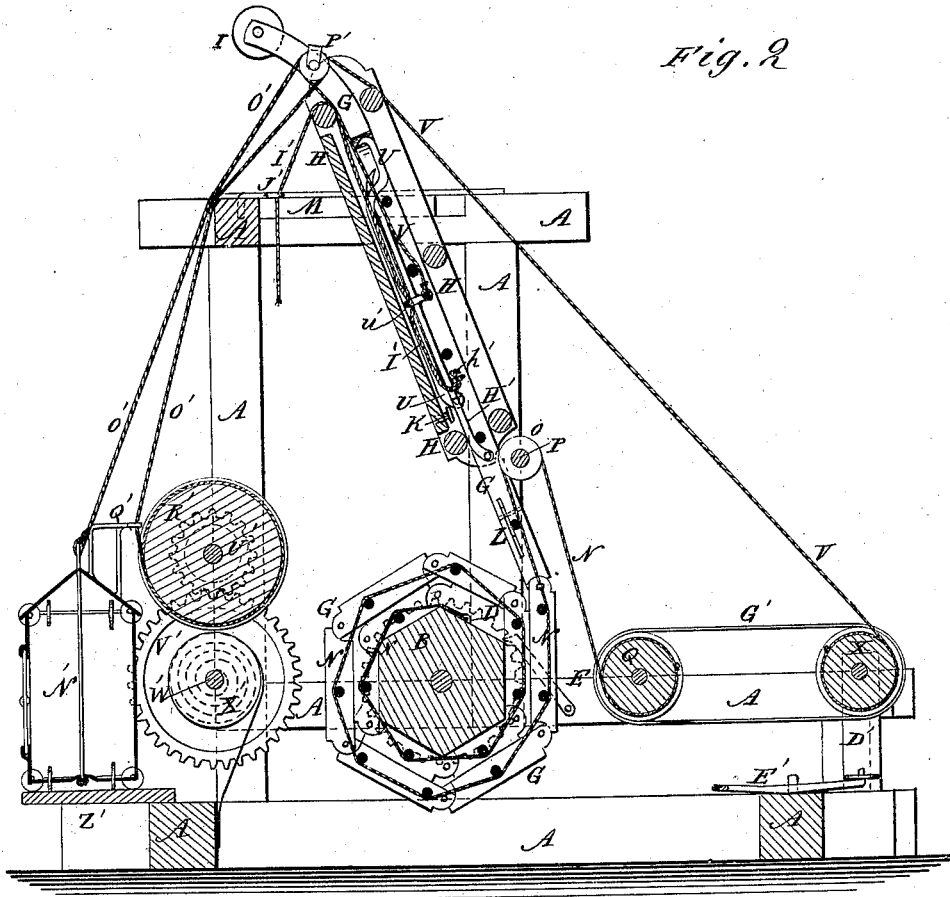


Fig. 2

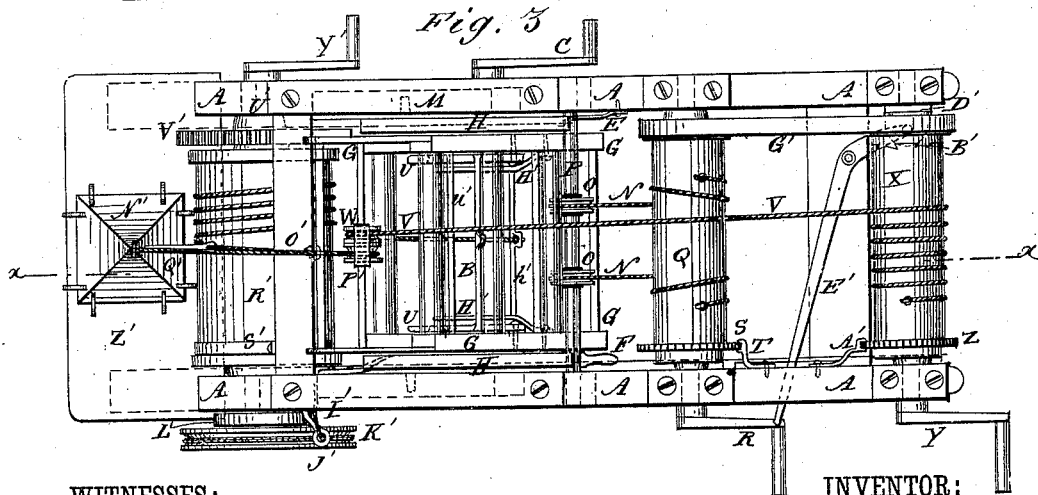


Fig. 3

WITNESSES:

*C. Neveu*  
*C. Sedgwick*

INVENTOR:

*La F. Twitchell*  
*J. A. Clark*  
 BY *Munn & Co.*  
 ATTORNEYS.

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Fig. 4

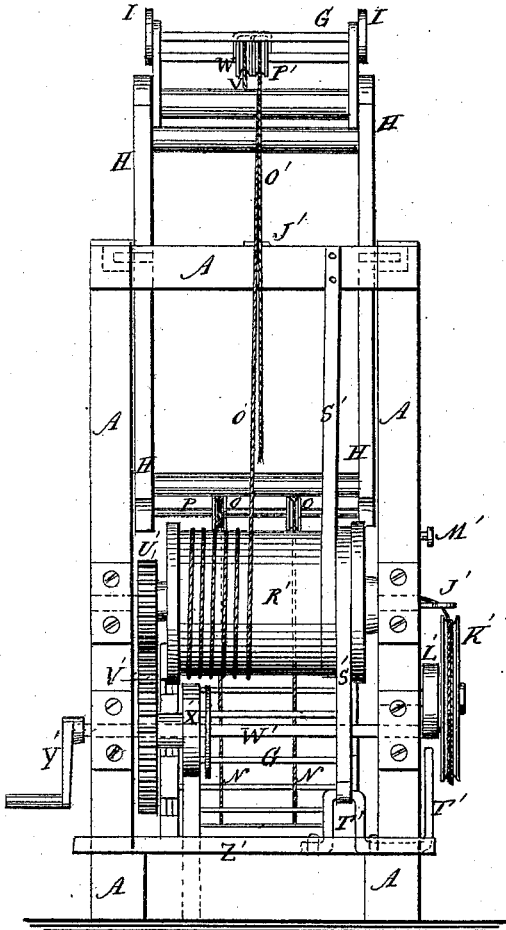


Fig. 5

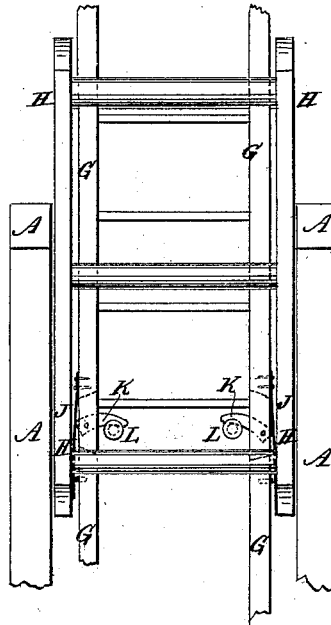


Fig. 7

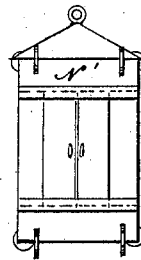
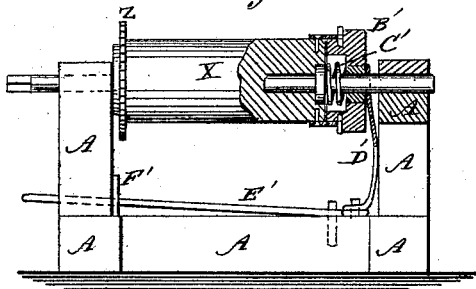


Fig. 6



WITNESSES:

*C. Neveux*  
*C. Sedgwick*

INVENTOR:

*LaF. Twitchell*  
*J. A. Clark*  
BY *Mumford*  
ATTORNEYS.

# UNITED STATES PATENT OFFICE.

LA FAYETTE TWITCHELL AND JOHN A. CLARK, OF ELIZABETHTOWN, ILL.

## IMPROVEMENT IN FIRE-ESCAPE LADDERS.

Specification forming part of Letters Patent No. **212,768**, dated February 25, 1879; application filed November 12, 1878.

*To all whom it may concern:*

Be it known that we, LA FAYETTE TWITCHELL and JOHN A. CLARK, of Elizabethtown, in the county of Hardin and State of Illinois, have invented a new and useful Improvement in Extension Fire-Escape Ladders or Elevators, of which the following is a specification:

Figure 1, Sheet 1, is a side view of our improved apparatus, shown as extended. Fig. 2, Sheet 2, is a vertical section of the same, taken through the line *x x*, Fig. 3, and shown as arranged for transportation. Fig. 3, Sheet 2, is a top view of the same. Fig. 4, Sheet 3, is a rear view of the same, the cage being removed. Fig. 5, Sheet 3, is a detail view, showing the spring-catches for stiffening the joints. Fig. 6, Sheet 3, is a detail sectional view of the guy-rope shaft and clutch-pulley. Fig. 7, Sheet 3, is a detail view of the cage.

Similar letters of reference indicate corresponding parts.

The object of this invention is to furnish an improved fire-escape ladder which shall be so constructed that it may be easily and quickly extended to any desired height, may be securely held in place when extended, may be contracted or rolled up into compact form for transportation and storage, and may be used for raising and lowering people, furniture, and other materials.

The invention will first be described in connection with the drawings, and then pointed out in the claims.

A represents the frame-work of the machine, which is designed to be mounted upon wheels for convenience in moving it from place to place. B is a hexagonal cylinder or drum, the journals of which revolve in bearings attached to the frame A, and to one or both of said journals are attached cranks C. To one end of the cylinder B is attached a ratchet-wheel, D, with the teeth of which engages a pawl, E, pivoted to the frame A. The other end of the hexagonal cylinder B is rounded off, and upon it rests the spring-lever F, one end of which is attached to the frame A, and which serves as a brake for controlling the movement of the said cylinder B.

To the hexagonal cylinder B is attached the end of the ladder G, which is made in sections, connected to each other by hinge or rule

joints. The first six sections of the ladder G are made of such a length as to roll snugly upon the cylinder B. The next six sections are made of such a length as to roll snugly upon the first six sections, and so on to the last section, which is made longer, as it is never drawn below the chute H. The upper ends of the side bars of the upper section, G, or bars attached to the said side bars, are curved to the rearward, and have small wheels I pivoted to them to roll upon the side of the building against which the ladder is raised, so that its upper end can be readily adjusted higher or lower, as required.

To the outer sides of the side bars of each upper section are attached springs J, which project across the joints at the lower ends of the said upper sections, and overlap the side bars of the next lower sections, where they engage with stops or catches, so as to stiffen and strengthen the joints between the said sections. The springs J are raised from their catches when the sections are passing to or from the hexagonal cylinder B by lever-cams K, which are pivoted in slots in the side bars of the sections G, and are operated by striking against stop-pins L, attached to the lower part of the chute H. The chute H is pivoted to and supported by short bars M, that slide in grooves or rabbets in the top side bars of the frame A, so that it may adjust itself as the inclination of the ladder G changes, and is provided with friction-rollers to cause the ladder G to move up and down freely and easily.

To the hexagonal cylinder B, near the points at which the end of the inner section of the ladder G is secured, are attached the ends of two ropes, N, which, as the ladder G is wound upon the said cylinder, are wound up with it and upon its outer side. The ropes N pass over pulleys O, running loosely upon the rod P, the ends of which are secured to the frame A.

From the pulleys O the ropes N pass to and around the shaft or cylinder Q, to which their other ends are attached, and the journals of which revolve in bearings attached to the frame A.

To one or both of the journals of the cylinder Q are attached the cranks R, by means of which it is operated.

To one end of the cylinder Q is attached a ratchet-wheel, S, with the teeth of which engages the pawl T, pivoted to the frame A, so as to hold the cylinder Q and the ladder G into any position into which they may be adjusted.

To the inner sides of the side bars of the long upper sections of the ladder G are pivoted the ends of two arms, U, which are connected, at a little distance from their pivoted ends, by a cross-bar, *w*', and upon their free ends are formed hooks, to hook upon the frame of a window.

To the middle part of the cross-bar of the hooks U is attached the end of a rope, V, which passes over a round of the ladder G, and around a pulley, W, pivoted to an upper round of the said ladder.

From the pulley W the rope V passes down along the forward side of the ladder G, and its other end is attached to the cylinder X.

The journals of the cylinder X revolve in bearings attached to the frame A, a little in front of the bearings of the cylinder Q; and to one or both of the said journals are attached cranks Y, by means of which the said cylinder is operated.

To one end of the cylinder X is attached a ratchet-wheel, Z, with the teeth of which engages the pawl A', pivoted to the frame A. Upon the journal of the cylinder X, at its other end, is placed a clutch-pulley, B', which is held out of gear with the end of the said cylinder X by a spiral spring, C', placed upon the said journal in a recess in the inner side of the pulley B', one end of the said spring resting against the said pulley B', and its other end resting against the end of the cylinder X, or against a collar formed upon the journal of the said cylinder X.

D' is a curved spring, the upper end of which is slotted or notched to receive the journal of the cylinder X, and rests against the outer side of the clutch-pulley B'. The bend of the spring D' rests against a post of the frame A, and its lower end is pivoted to the end of a bent lever, E'. The lever E' is pivoted at its bend to the frame A, and its other or long arm passes across a toothed bar, F', attached to the frame A, to hold the said lever securely in place when adjusted.

Around the clutch-pulley B' passes an endless belt, G', which also passes around the end of the cylinder Q, or around a pulley attached to the said end.

The pulley B' and the belt G' allow the cylinder X to be used to assist the cylinder Q in raising the ladder G, and, when ungeared, allow the cylinder X to be used in operating the guy-line V and hooks U.

To the inner sides of the side bars of the ladder G, a little below the hooks U, are pivoted the braces H, the outer ends of which are pointed, to prevent them from slipping upon the wall of the building against which they rest.

The braces H' are connected at a little distance

from their pivoted ends by a cross-bar, *h*', to the center of which is attached the end of a rope, I', which passes through a guide-eye formed in or over a guide-pulley pivoted to the middle part of the cross-bar *w*' of the hooks U.

The rope I' passes down through guide-eyes J', attached to the frame A, or around guide-pulleys pivoted to the said frame A, and its other end is attached to and wound around a spool or drum, K', pivoted to the lower part of the frame A.

Upon the journal of the spool K' is placed a coiled spring, L', one end of which is attached to the said spool K', and its other end is attached to the frame A. The spring L' is so arranged that it will be coiled by the unwinding of the rope I', so that its tension may always keep the said rope I' taut, and may wind it up as it is slackened by lowering the ladder G.

When the ladder G has been extended for use the rope I' may be secured by giving it one or more turns around a belaying-pin, M', attached to the frame A a little above the spool K'.

N' is the cage, which is made of sheet-iron or other non-combustible material, and of any desired or convenient size, and is provided with sliding doors upon its forward side.

The cage N' is preferably made with a pyramid-shaped roof, and has small rollers pivoted to it at the upper and lower ends of each side, so that it will readily pass any obstructions it may encounter when being raised and lowered.

To the center of the top of the cage N' is attached the end of a rope, O', which passes over a pulley, P', pivoted to an upper round of the ladder G. From the pulley P' the rope O' passes down through a guide-eye in an arm or bracket, Q', attached to the top of the cage N', and its lower end is attached to and wound around a drum, R', the journals of which revolve in bearings attached to the rear part of the frame A.

Around one end of the drum R' is passed a metallic brake-strap, S', the upper end of which is attached to the frame A. The lower end of the brake-strap S' is attached to the crank-lever T', which is pivoted to the frame A, and its end, arm, or handle extends into such a position that it can be conveniently reached and operated when it is desired to apply the brake.

To the other end of the drum R' is attached a small gear-wheel, U', the teeth of which mesh into the teeth of the larger gear-wheel V'. The gear-wheel V' is attached to the shaft W', which revolves in bearings attached to the frame A.

To the shaft W' is attached the end of a spring, X', which is coiled around the said shaft, and its other end is attached to the frame A. The spring X' is so arranged as to be coiled up as the cage N' is lowered, so that its resistance may retard the descent of the said cage N', and its elasticity may assist in

raising it. The spring X' also takes up the slack of the cage-line O' as the ladder G is wound up.

To one end of the shaft W' is attached a crank, Y', by means of which the drum R' may be revolved to raise and lower the cage. With this construction the cage N' is raised by operating the crank Y'.

When the loaded cage N' is to be lowered its descent may be controlled by the brake S' T'; but when empty it should be lowered by means of the crank Y'.

To the rear part of the base of the frame A is attached a platform, Z', for the cage N' to stand upon when not in use.

The whole apparatus is made of metal, the rigid parts being made of iron bars and the ropes of wires, so that the apparatus can be used for lowering people and goods from the upper parts of buildings even when the flames are bursting out from their sides.

The apparatus may be made of any desired materials, as the purpose or purposes for which it is to be used may require.

We are aware that it is not new to employ a ladder formed in sections and adapted to be wound on a drum, or to elevate and lower it by ropes and pulleys, or to use a pivoted hook in connection with a drum, ropes, and pulleys; but

What we claim as new and of our invention is—

1. The ladder G, made in sections, hinged or jointed to each other, and graduated to adapt it to be wound upon a hexagonal cylinder, B, in combination with the said cylinder B and with the pivoted guide-chute H, substantially as herein shown and described.

2. The combination of the spring-catches J,

the lever-cams K, and the stop-pins L with the jointed sectional ladder G and the pivoted chute H, substantially as herein shown and described.

3. The combination of the clutch-pulley B', the springs C' D', the lever E', and the endless band G' with the guy-rope cylinder X and the hoisting-rope cylinder Q, substantially as herein shown and described.

4. The combination of the pivoted braces H', the rope I', the belaying-pin M', and the spool and spring K' L' with the pivoted hooks U, the rope V, and the jointed sectional ladder G, substantially as herein shown and described.

5. The cage N', made with a pyramid top and sliding doors, and provided with pivoted rollers at the upper and lower ends of its sides, to adapt it for use for lowering persons and goods from burning buildings, substantially as herein shown and described.

6. The combination of the rope O', the pulley P', the drum R', the brake-strap and crank-lever S' T', the gear-wheels U' V', the crank Y', and the spring X' with the jointed sectional ladder G, substantially as herein shown and described.

7. The combination of the cage N', provided with the guide-arm Q', the rope O', the pulley P', the drum R', the brake-strap and crank-lever S' T', the gear-wheels U' V', the crank Y', and the spring X' with the jointed sectional ladder G, substantially as herein shown and described.

LA FAYETTE TWITCHELL.  
JOHN ALEXANDER CLARK.

Witnesses:

JOHN C. SMITH,  
JAMES A. VINYARD.