J. M. BIRCHLER.

Extensible Fire-Ladder.

No. 163,725. Patented May 25, 1875.

Fig. 1

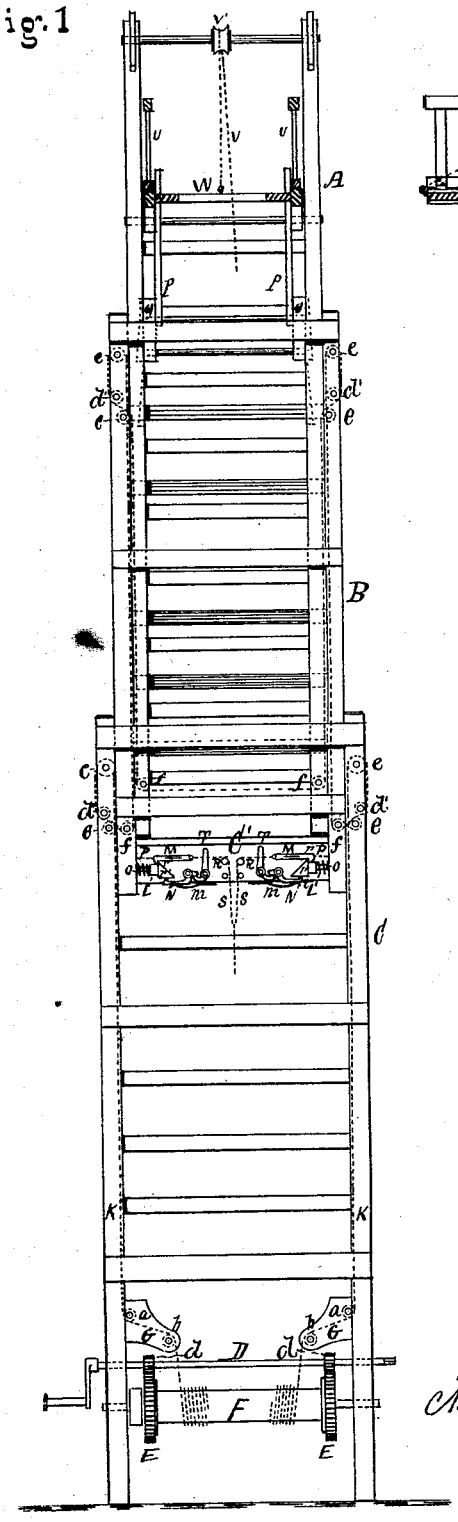

Fig. 4

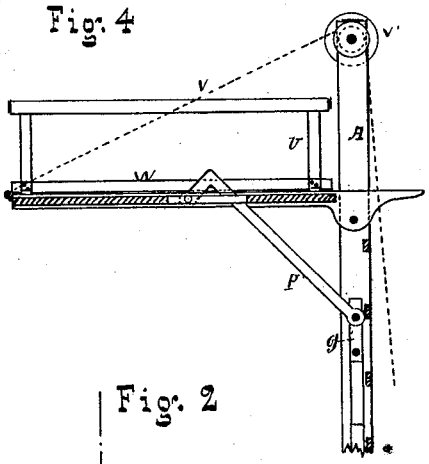

Fig. 2

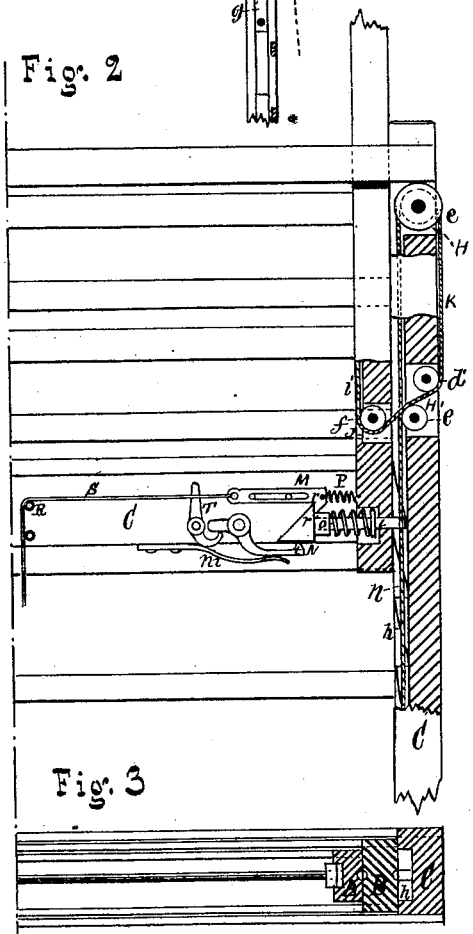

Fig. 3

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UNITED STATES PATENT OFFICE.

JOSEPH M. BIRCHLER, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN EXTENSIBLE FIRE-LADDERS.

Specification forming part of Letters Patent No. **163,725**, dated May 25, 1875; application filed March 15, 1875.

To all whom it may concern:

Be it known that I, JOSEPH M. BIRCHLER, of Chicago, in the county of Cook and State of Illinois, have invented certain Improvements in Extension-Ladders; and I do hereby declare the following to be a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing forming part of this specification, in which—

Figure 1 is a front elevation of an extension-ladder embodying my said invention. Fig. 2 is an enlarged vertical section of a portion of the same, showing the manner of adjusting the cords employed in elevating the separate sections of the ladder. Fig. 3 is an enlarged sectional plan of the side rails, showing the manner of securing one to the other, and Fig. 4 is a vertical central section of the platform employed, showing the manner of adjusting the same.

Similar letters of reference indicate like parts in the several figures of the drawing.

My invention relates to that class of extension-ladders which are made in sections, secured one within the other, and so arranged as to admit of being elongated by the adjustment of the separate sections; and it consists in the combination of parts employed in securing the separate sections in an elevated position. It further consists in the means employed in adjusting the platform, as will be more fully understood by the following description and claim.

In the drawing, A B C represent the separate sections of the ladder, which are substantially made and fitted one into the other, in the usual manner, as shown in Figs. 1 and 3. The lower section C of the ladder, when desired, may be mounted on a suitable carriage, (not shown in the drawing,) but as the same constitutes no part of this invention, I will omit a description of it in detail. D is a crank-shaft, which is journaled to the side rails of section C, and so arranged as to admit of a free and easy rotary motion. Mounted on this shaft, at a point near the rails, are gear-pinions *d d*, which take into corresponding gear-wheels E E mounted on a drum-shaft, F, journaled to the side rails below shaft D. Permanently attached to each side rail of section C is a bracket, G, located immediately over the crank-shaft. Journaled to each of the brackets are sheave-wheels *a b*, arranged to freely revolve on their bearings. The upper end of each side rail of the separate sections (except those of the upper section) is provided with mortises H H′ formed through the same, as shown in Fig. 2. Journaled within each of the mortises H and H′ are sheave-wheels *c*, *d′*, and *e*, arranged to freely revolve on their bearings. The lower end of each side rail of the separate sections (except those of the lower section) is provided with a mortise, J, within which is journaled a sheave-wheel, *f*, as shown in Fig. 2. Permanently attached to and around the drum of shaft F are the adjusting-cords K K for elevating the separate sections of the ladder. These cords each pass upward through a groove, *h*, on the inner side of the rails of section C to and over sheave-wheel *c;* thence downward under sheave-wheel *d′* and over sheave-wheel *e;* thence downward under sheave-wheel *f* of section B; thence upward, through groove *i*, to and over sheave-wheel *e* of section B; thence downward under wheel *d* and over wheel *e* of said section; thence downward to the lower end of section A, as shown by dotted lines, Fig. 1, and are permanently secured thereto.

The adjustment of these cords is such that when a rotary motion is imparted to the drum the cords are wound around the same, causing section B of the ladder to move in the direction of its length, until wheels *f* of the same are in the same horizontal plane with wheels *d* of section C, when its movement ceases, and the cords then act to move section A in a like manner, adjusting the ladder to its full length. The inner face of each side rail of section C is provided with a series of indentations, *n*, shown in Fig. 2.

These indentations are arranged at graduated distances, one from the other, and are adapted to receive the projecting ends of sliding pawls L L, secured to the lower cross-rail C′ of section B, by which means the latter section is held at any adjusted point when elevated. These pawls are moved in the direction of their lengths, so as to pass into the in-

dentations by means of coiled springs *o o* secured around the same. Loosely secured to the cross-rail C′, over the pawls, are sliding catches M M, which are so arranged as to admit of a free and easy longitudinal movement.

Permanently secured to the end of each of the catches M is a spring, P, which is secured to the side rails of section B. Permanently attached to the opposite end of each of said catches M is a cord, S, which passes over a sheave-wheel, R, journaled to the center of the cross-rail, as shown in Figs. 1 and 2. The end of each of the catches M is provided with a shoulder, *r*, which engages a corresponding shoulder, *r′*, on the inner end of the pawl. N N are pawl-levers, which are fulcrumed to the cross-rail C′, and so arranged as to allow their outer ends to pass under pawls L L. Permanently attached to the lower edge of rail C′ are springs *m m*, which bear against the lower surfaces of the pawl-levers N N, by which means the latter are held firmly against their respective pawls L. T T are vertical levers, which are fulcrumed to rail C′, near the inner end of pawl-levers N N, as shown in Figs. 1 and 2. The lower ends of these levers are curved outward, and so arranged as to bear against the lower edge of the inner ends of the pawl-levers, by which means the latter levers are disengaged from the pawls L L when the upper end of levers T T are moved toward each other. The outer end of each pawl-lever is provided with a shoulder, *t*, which engages shoulder *r′* of its adjacent pawl, when the latter is drawn inward so as to disengage its outer end from the indentations in the side rails, by which means the pawls are held in a fixed position and disengaged from the indentations when section B of the ladder is descending.

The operations of these parts are such that when section B is being elevated the pawls L L take into each indentation in the side rails of section C, by which means section B can be rigidly secured at any adjusted height; but when necessary to allow said section to descend the operator pulls downward on the cords *s s*, which imparts a longitudinal movement to the catches M M, bringing shoulder *r* against shoulder *r′* of pawls L L, moving the latter inward so as to disengage the same from the indentation, the shoulders *t* of the pawl-levers N N engaging shoulders *r′* of pawls L L, holding the latter in a fixed position, and section B is moved downward by its own gravity. When necessary to allow the pawls L L to move outward to again engage the indentations, the operator again pulls down on ends *s s*, so as to bring the inner end of catches M M against levers T T, moving the latter toward each other, which moves the outer ends of pawl-levers N N downward, disengaging shoulder *t* from shoulder *r′* of pawls L L, and the latter are thrown outward by the expansion of springs *o o*, and section B is again secured in a fixed position.

Hinged to the upper end of the upper section A is a platform, W, which is so arranged so as to admit of being dropped to a vertical position. Permanently attached to the outer end of this platform is an adjusting-cord, V, the latter passing over a sheave wheel, V′, on the top rail of the ladder, by which means the platform is elevated to a horizontal position.

Hinged to the upper surface of the platform are side rails U U, arranged to fold at rest against the platform, when the latter is in a vertical position.

Hinged to the center and on each side of the platform are cam-braces *p p*, the lower ends of which are secured in a frame, *g*, the ends of which are fitted into a groove formed on the inner surface of each side rail of the upper section, and so arranged as to freely move therein. The arrangement of these braces is such that as the platform is elevated to a horizontal position, the cams of said braces come in contact with side rails U U, moving them to a vertical position, forming the sides of the platform.

Having thus described my invention, I claim—

1. The combination of spring-pawls L L, catches M M, and cords *s s*, as specified.

2. In combination with spring-pawls L L, catches M M, and cords *s s*, the pawl-levers N N, springs *m m*, and levers T T, as specified.

3. In combination with platform W, hinged to the top section A, and provided with the side rails U U, the cam-braces *p p* for adjusting the side rails, as specified.

The above specification of my invention signed by me this 2d day of March, 1875.

JOSEPH M. BIRCHLER.

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