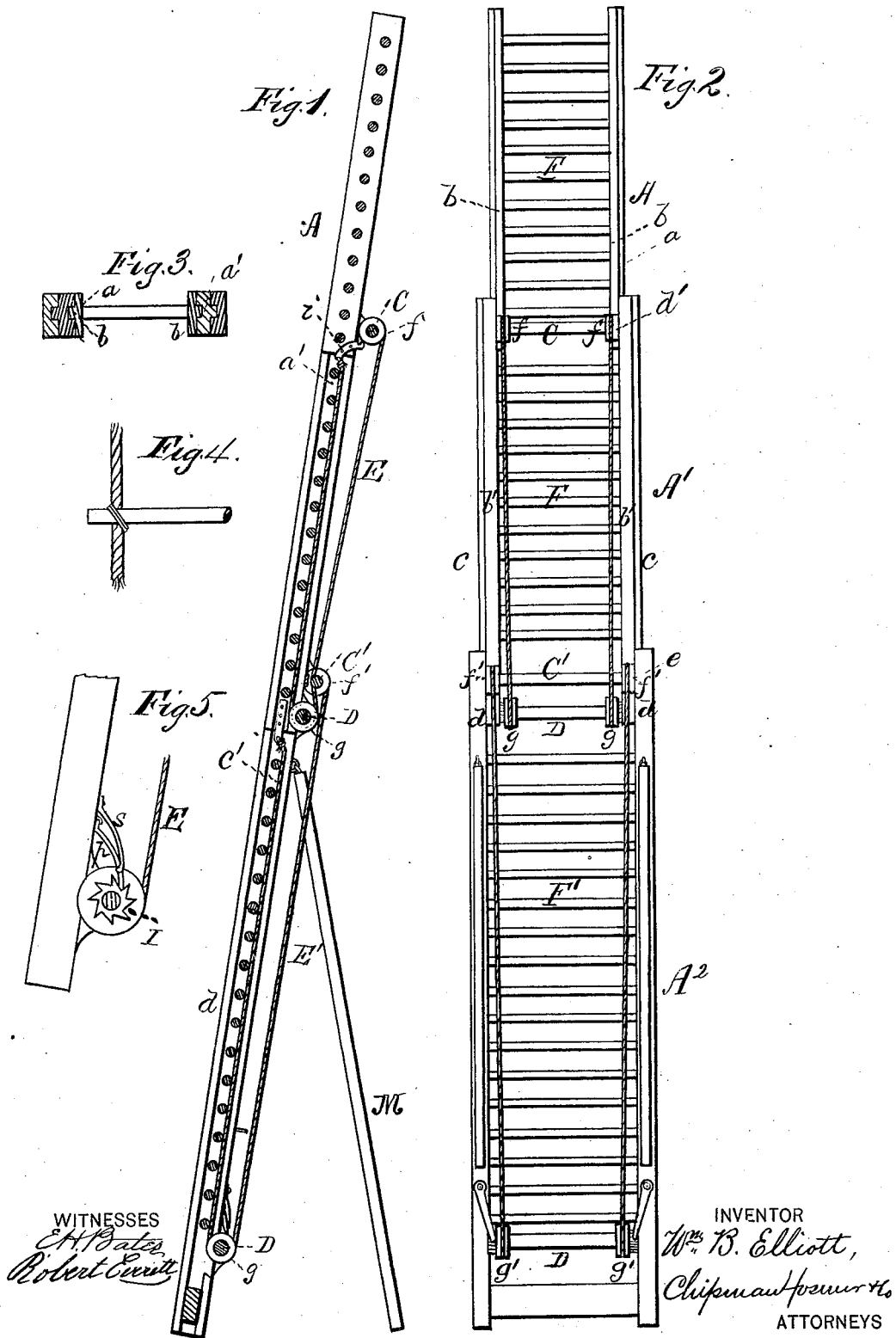


W. B. ELLIOTT.  
Extensible Ladder.

No. 163,856.

Patented June 1, 1875.



# UNITED STATES PATENT OFFICE.

WILLIAM B. ELLIOTT, OF CORNING, NEW YORK.

## IMPROVEMENT IN EXTENSIBLE LADDERS.

Specification forming part of Letters Patent No. **163,856**, dated June 1, 1875; application filed October 31, 1874.

*To all whom it may concern:*

Be it known that I, WILLIAM B. ELLIOTT, of Corning, in the county of Steuben and State of New York, have invented a new and valuable Improvement in Extension-Ladders; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings making a part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 of the drawing is a representation of a longitudinal section of my ladder. Fig. 2 is a plan view of the same; and Figs. 3, 4, and 5 are detail views.

This invention has relation to ladders which are especially designed to be extended or contracted to meet the requirements of firemen, painters, and others; and the nature of the invention consists in a ladder composed of an upper section and two or more rectangular frames, the ladder and its frame telescoping into that frame next below, and capable of extension by means of ropes attached to the lower end of the said ladder and its frame, passing thence over rag-wheels upon the lower ends of the said frames, thence upward over pulley-shafts at the upper ends thereof, thence to a point near their commencement, whereby the said upper section, which is a common ladder, is capable of being extended out of the frame, and the latter out of its frame, as will be hereinafter more fully explained.

In the annexed drawings, A designates the upper section of my improved ladder, which is adapted to telescope within the frame A<sup>1</sup> by means of a guiding flange or tongue, *a*, upon the outer surfaces of the uprights *b* of the former, which are received into corresponding grooves *a'* in the inner surfaces of the longitudinal beams *b'* of the latter. The frame A<sup>1</sup> also telescopes into the frame A<sup>2</sup>, and is guided in its ascent and descent by tongues *c* upon its longitudinal bars *b'*, which are received into corresponding grooves *c'* in the inner surfaces of the longitudinal bars *d* of the latter, both of which are suitably braced at top and bottom. At the upper end of the frames A<sup>1</sup> A<sup>2</sup> shafts C C' are rigidly secured in lugs or bearings *d' e*, upon and at each end of which pulleys *f f'* revolve. The lower ends of the

frames are in like manner provided with rotating shafts D D', upon each end of which are suitably keyed rag-wheels *g g'*, each of these shafts being actuated by means of a crank-arm. (Not shown in the drawings.) E E' are ropes, by means of which the ladder A and the frame A<sup>1</sup> are made to extend upward, as shown in Fig. 1. The ropes E are secured to the lower ends of the uprights of the ladder-section A, passing thence downward over the rag-wheels *g* of shaft D, into a deep peripheral groove of which they are received. They then are passed upward over the pulleys *f* of shaft C at the upper end of the frame A<sup>1</sup>, whence they extend downward, and, having been drawn tight, are rigidly attached to one end of arms *i*, to the other ends of which the other extremities of these ropes have been previously secured, the said arms being rigidly attached to the bars *b*. The ropes E' are in like manner rigidly secured to the lower ends of the beams of the frame A<sup>1</sup>, passing thence downward over the rag-wheels *g'* of shaft D', thence upward over the pulley-wheels *f'* of shaft C', whence they are extended downward, and, being drawn tight, are rigidly and securely attached to the frame A<sup>1</sup> near its lower end, and preferably at a point above the points of attachment of its other ends. The rear portion of each of these ropes is provided with a number of spaced rounds, F F', sufficient to occupy the whole space between the upper and lower ends of the sections A A<sup>1</sup>.

If the shaft D at the lower end of the frame A<sup>1</sup> be now operated, the section A<sup>1</sup> will be extended at the same time that the round-provided portion of the ropes E is drawn over the said shaft, the ends of the rounds engaging into the groove *a'* of the said frame, effectually preventing all displacement thereof, and accurately guiding the said rope ladder upward, and if now the shaft D' be actuated, the sections A<sup>1</sup> and ladder A will be extended in one movement, the rounds F' being in like manner brought over the said shaft to the front, their ends becoming engaged with the grooves *c'* of section A<sup>2</sup> with the same useful result.

With a view to preventing a sliding of the ropes E E' in the grooves of their pulleys, I have used a rag-wheel at each end of the

winches D D', so that the rounds becoming engaged in the spaces between the teeth will be there held, and will prevent this slipping; and with a view to preventing the operator from coming down by the run, in consequence of the turning of the shafts, which would necessarily occur as soon as he placed his weight upon the rope ladder, I have provided the rag-wheels each with a toothed ratchet-wheel, I, with which a pivoted pawl, *p*, on the uprights of the frame may be made to engage, the engagement being preserved by means of a spring, S, as shown in Fig. 5.

It will be seen from the above description that by disengaging the pawl *p* from the ratchet I of rag-wheels *g'*, the section A<sup>1</sup> and ladder A may be lowered, thus bringing the pawl *p* and ratchet I of rag-wheels *g*, and the winch D of section A<sup>1</sup>, within reach of the operator, and that thus the ladder A may be telescoped within the section A<sup>1</sup>, causing all the upper sections to fold in compact portable shape within the lower section. It will also be seen that the grooves *a'* of section A<sup>1</sup>, and the grooves *c'* of section A<sup>2</sup>, serve a double purpose, namely, as guides to the ladder A and section A<sup>1</sup>, respectively, and to the rounds F F' of the ropes E E'.

With a view to giving the lower frame adequate support while the upper frame and ladder are being run up, I have caused poles or arms M to be hinged to the uprights of the

lower section A<sup>2</sup>, which, when drawn outward from the foot of the ladder, will hold it up, enabling me to dispense with rollers on the upper ends of the ladder A, and avoiding the additional friction which would be caused in running out the sections if the upper ends of the ladder were rested against the wall.

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

1. The combination, with the ladder A, of the frames A<sup>1</sup> A<sup>2</sup>, substantially as specified.

2. The combination, with the grooves *a'* *c'* in the sections A<sup>1</sup> A<sup>2</sup>, respectively, of the rounds F F' and the ropes E E', substantially as specified.

3. The combination, with the shafts C C', having pulleys *f f'*, and the winches D D', having rag-wheels *g g'*, of the ropes E E', having ladder-rounds F F', substantially as specified.

4. The combination of the ropes E E', having rounds F F', with the rag-wheels *g g'*, ratchet-wheel I, pawls *p*, and retaining-springs S, as specified, and for the purpose set forth.

In testimony that I claim the above I have hereunto subscribed my name in the presence of two witnesses.

WILLIAM B. ELLIOTT.

Witnesses:

I. G. WELLINGTON,

SAML. B. WELLINGTON.