

(No Model.)

J. L. CRAFTS.
EXTENSION LADDER.

No. 361,137.
Fig. 1.

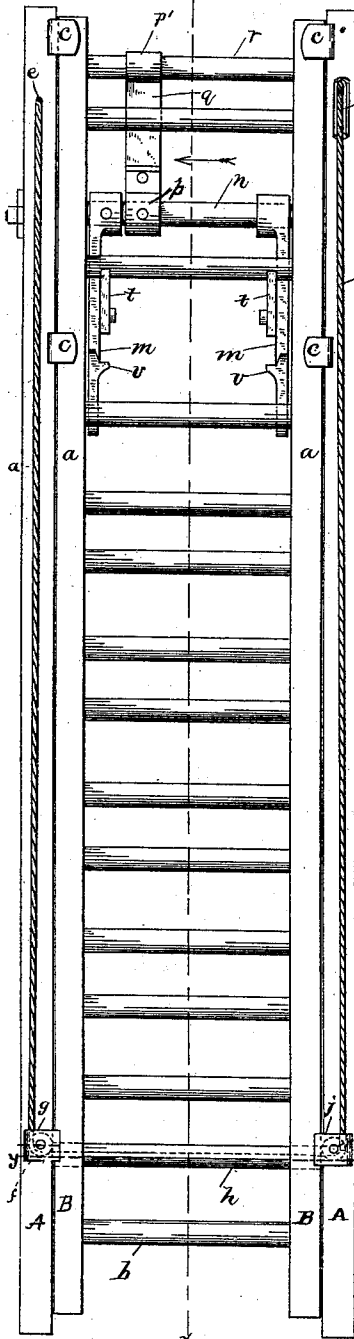
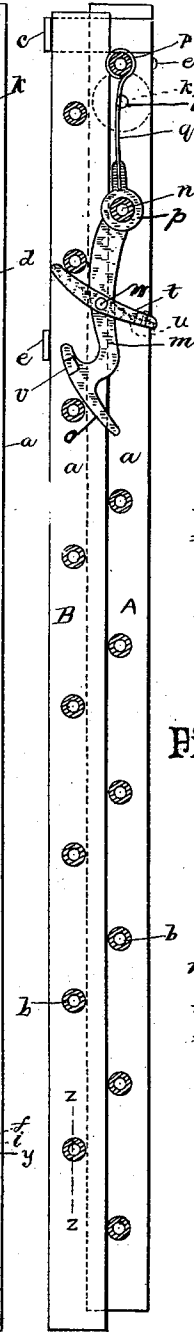


Fig. 2.



Patented Apr. 12, 1887.
Fig. 3.

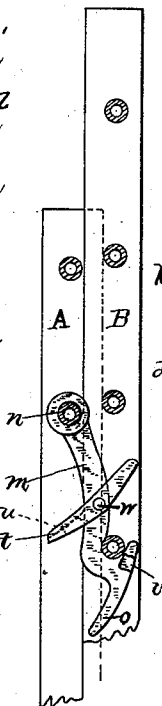


Fig. 5.

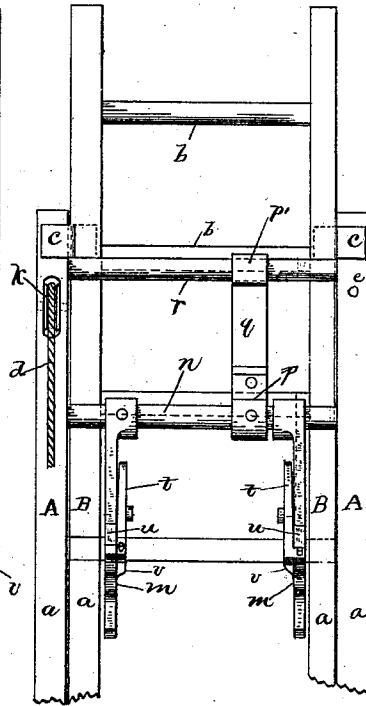


Fig. 4.

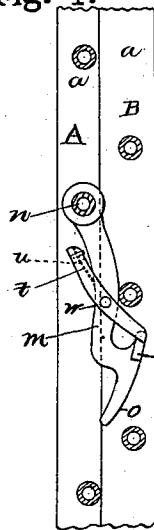


Fig. 6.

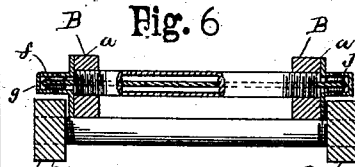
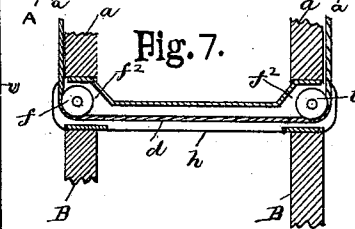


Fig. 7.



Witnesses:

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UNITED STATES PATENT OFFICE.

JOHN L. CRAFTS, OF SOMERVILLE, MASSACHUSETTS.

EXTENSION-LADDER.

SPECIFICATION forming part of Letters Patent No. 361,137, dated April 12, 1887.

Application filed January 4, 1887. Serial No. 223,350. (No model.)

To all whom it may concern:

Be it known that I, JOHN L. CRAFTS, of Somerville, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Extension-Ladders, of which the following is a specification.

My invention relates to what are commonly known as "extension-ladders"—that is, ladders having a movable section which is projected in prolongation of the main section.

It is the object of my invention to so improve the contrivances for holding the movable section in projected position as to render their operation certain and effective irrespective of the position in which the ladder may by chance or of necessity be held.

It is also the object of my invention to simplify and otherwise improve the means whereby the movable or upper section is projected or raised.

It is also the object of my invention to so modify the construction of the means which permit of the lowering of the upper or movable section as to permit this operation to be readily and easily accomplished.

It is also the object of my invention to improve the construction of the rounds of the ladder, as also the manner of securing them to the side pieces.

I will now proceed to describe my invention, so that others may be able to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, forming a part of this specification, in which drawings—

Figure 1 is a front elevation of my improved extension-ladder. Fig. 2 is a section on the line *x x*, Fig. 1, looking in the direction of the arrow. Figs. 3 and 4 are sections on the line *x x*, Fig. 1, looking in a direction opposite to the arrow. Fig. 5 is a rear view. Fig. 6 is a section on the line *y y*, Fig. 1. Fig. 7 represents a section on line *z z*, Fig. 2, showing a different form of cord-conducting round.

Similar letters of reference indicate similar parts in all the views.

In the drawings, A represents the lower or supporting section, and B the upper or sliding section. Both sections comprise side pieces, *a a*, of common or suitable construction, with rounds *b b* arranged at suitable intervals

therebetween. The latter devices are composed preferably of hollow metal tubes, each provided on one end with a right-hand screw-thread and on the opposite end with a left-hand screw-thread, which construction enables them to be turned into and secured to the side pieces, and at the same time provides means whereby the latter may be adjusted with respect to each other. The side pieces of section B are also so arranged as to fit loosely within the bounds of the inner sides of the side pieces of section A and be movable on the rounds of the latter section, as shown most clearly in Fig. 1.

c c represent cleats or lips secured at their rearward or inner ends to section A, and extending outward and over the side pieces of section B, to guide it in its longitudinal movements.

d indicates a cord, rope, or chain secured at one end, as at *e*, to the upper end of one of the side pieces of lower section, A, and extending down and around a pulley, *f*, journaled in a slot in the lower portion of one of the side pieces of the upper section, B, through a hollow round, *h*, to and around another pulley, *i*, in the opposite side piece of the opposite section, up and over a pulley, *k*, adapted to turn on a stud, *l*, at the upper end of the side piece of section B opposite that at which the other end of the cord or rope is secured. It will now be seen that by drawing on the free end of the cord or rope depending from pulley *k* section B may be moved up on the rounds of section A, guided by the cleats or lips *c*, and so extended until stopped by the contact of brackets *g j* with lower cleats, *c*.

m m indicate hooks rigidly secured at their upper ends to a round, *n*, adapted to turn in the side pieces of section A. The lower ends of said hooks are extended somewhat, as shown at *o*, and the outer face of said extension and ends are inclined or rounded, as also represented in Figs. 2, 3, and 4.

p indicates a nut or collar, also rigidly secured to the round *n*, and to said nut or collar is attached a spring, *q*, connected at its upper end, as at *p'*, with the upper round, *r*, of section A, said spring operating with a tendency to throw the lower ends of the hooks *m m* outward or forward, so that when the upper section, B, is moved upward on the lower

section, A, the rounds of said upper section will successively bear on the inclined or rounded ends of hooks *m* and displace or press said hooks backward against the tension of said spring *q*. Said spring forces the hooks outwardly after each upwardly-moving round passes and releases said hooks, so that if the upper section be allowed to gravitate just after one of its rounds has released the hooks said round will be caught and supported by the hooks. By thus securing the hooks to a round adapted to rotate in its bearings and arranging the spring *q* to so operate the round to which the hooks are attached as to keep them pressed outward or forward, I provide a construction in which there is little or no liability of ice freezing on the device from interfering with the operation of the hooks—a difficulty experienced in structures heretofore in use.

t t represent dogs pivoted one to each hook *m*, on the inner side thereof. Said dogs are so constructed that their outer ends normally project across the path in which the rounds of the upper section move, and are displaced or pressed back by the upward movement of the rounds of said section, the outer ends of the dogs swinging outwardly under each round that passes and releases said dogs. A spring, *u*, is secured to the inner end of each of said dogs and rests at its forward and upper end against the rear face of the shanks of hooks *m*. The form and arrangement of springs *u* are such as to hold the outer ends of dogs *t* within the line of travel of the rounds of section B as said section is moved or projected on section A.

Each hook *m* is provided with a laterally or inwardly projecting lip, *v*, in such relation to the dogs *t* that when the latter are turned on their pivots *v* by the downward movement of a round of the upper section bearing on said dogs the outer ends of said dogs will bear on said lips *v* of the hooks *m* and force the hooks backward, as hereinafter described.

The operation of my invention will now be readily understood. By drawing down on the free end of cord *d* section B will be raised or projected on section A, the rounds of the former section engaging the inclined face of and pressing back hooks *m*, as described, and in like manner engaging and passing the upper forward ends of dogs *t*. When the upper section has been raised to the desired extent, and just after a round thereof has passed over and released the hooks *m*, said section is lowered slightly, when the hooks *m*, pressed forward by the tension of spring *q*, will engage said round and effectually hold said upper section in raised or extended position. When it is desired to lower the upper or movable section, said section is raised until the round held by the hooks *m* passes just above the outer upper ends of dogs *t* and is there allowed to descend by gravitation, bringing the rounds above the dogs successively in contact with the outer upper ends of said dogs, forcing them over into

contact with the lips *v* of hooks *m*, as indicated in Fig. 4, and forcing the hooks back, so that the rounds pass the hooks without being engaged thereby. The hooks, being arranged on the upper end of the lower section and held pressed outward by spring *q*, are certain at all times to be in position to engage the rounds of the upper or movable section without regard to the position of the ladder. The springs *u* on the dogs also insure the proper operative position of said dogs, whatever may be the position of the ladder.

The rounds *b*, being made hollow, are light and strong, and by providing the ends of said rounds with right and left hand screw-threads the side pieces can be adjusted, as has been explained, with the utmost nicety, while the most convenient means possible are provided for securing the rounds to their respective side pieces.

While I have been particular in describing the form and relationship of the various parts, it is obvious that these may be varied within the limits of mechanical skill without departing from the nature or spirit of the invention.

It will be seen that the means for raising and holding the sliding section of the ladder are arranged at and near the side pieces of the ladder, so that the space between said pieces is unobstructed. The ladder is thus made more convenient to use than extension-ladders in which the raising and holding devices are located midway between the side pieces, as usual.

I prefer to make the cord-conducting round of the upper section in the form of a hollow casting, (see Fig. 7,) open at its lower side and provided at its ends with enlarged chambers *f² f²*, which are fitted in mortises cut in the side pieces of the upper section. The pulleys *f f* are journaled in said chambers, and as the chambers are contained in the side pieces they are protected by the latter against injury, and do not project so as to injure the operator when the upper section is suddenly lowered.

Having thus described my invention, what I claim is—

1. An extension-ladder consisting of a lower section and an upper or movable section, the upper rounds of the lower section being provided with one or more hooks secured to a rotary round in said last-mentioned section and adapted to engage and hold the rounds of the upper section, and a spring connected at its lower end with said rotary round and at its upper end to a rigid round in the same section, whereby the hooks may be held pressed outward or forward, and ice freezing on the device will not be liable to interfere with the operation of the spring, substantially as set forth.

2. In an extension-ladder, the combination of the upper or sliding section, the lower or supporting section, the operating cord or chain secured at one end to the upper portion of the lower section, and passing thence downwardly and through a hollow round in the lower portion of the upper section, and thence upwardly over a pulley at the upper portion of the lower

section, its free end depending from said pulley, and means, substantially as set forth, connected with the upper end of the lower section for engaging and holding the upper or movable section, substantially as and for the purposes hereinbefore set forth.

3. An extension-ladder having an operating cord, rope, or chain attached to the upper end of its lower or stationary section, and passing from thence downward through a hollow round in the lower portion of the upper section, and from thence upwardly over a pulley at the upper end of the lower section, substantially as set forth.

4. The lower section, a cord, rope, or chain attached to the upper end of one of the side pieces of said section, a pulley arranged in the upper end of the other side piece of said section, an upper section having a hollow round, and a pulley attached to each side piece at the ends of said hollow round, said cord being arranged to pass over the pulleys of said upper section, through the hollow round thereof, and over the pulley arranged in the upper end of

one of the side pieces of the lower section, all constructed, combined, and arranged substantially as and for the purposes set forth.

5. The lower and upper sections, hooks *m*, round *n*, spring *q*, and round *r*, constructed, combined, and arranged substantially as and for the purposes set forth.

6. Hooks *m*, provided with lips *v*, dogs *t*, pivoted to hooks *m*, and springs *u*, constructed, combined, and arranged substantially as and for the purposes hereinbefore set forth.

7. The upper section having the hollow round provided at its ends with pulley-containing chambers fitted in mortises in the side pieces of said section, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 22d day of December, A. D. 1886.

JOHN L. CRAFTS.

Witnesses:

C. F. BROWN,

ARTHUR W. CROSSLEY.