

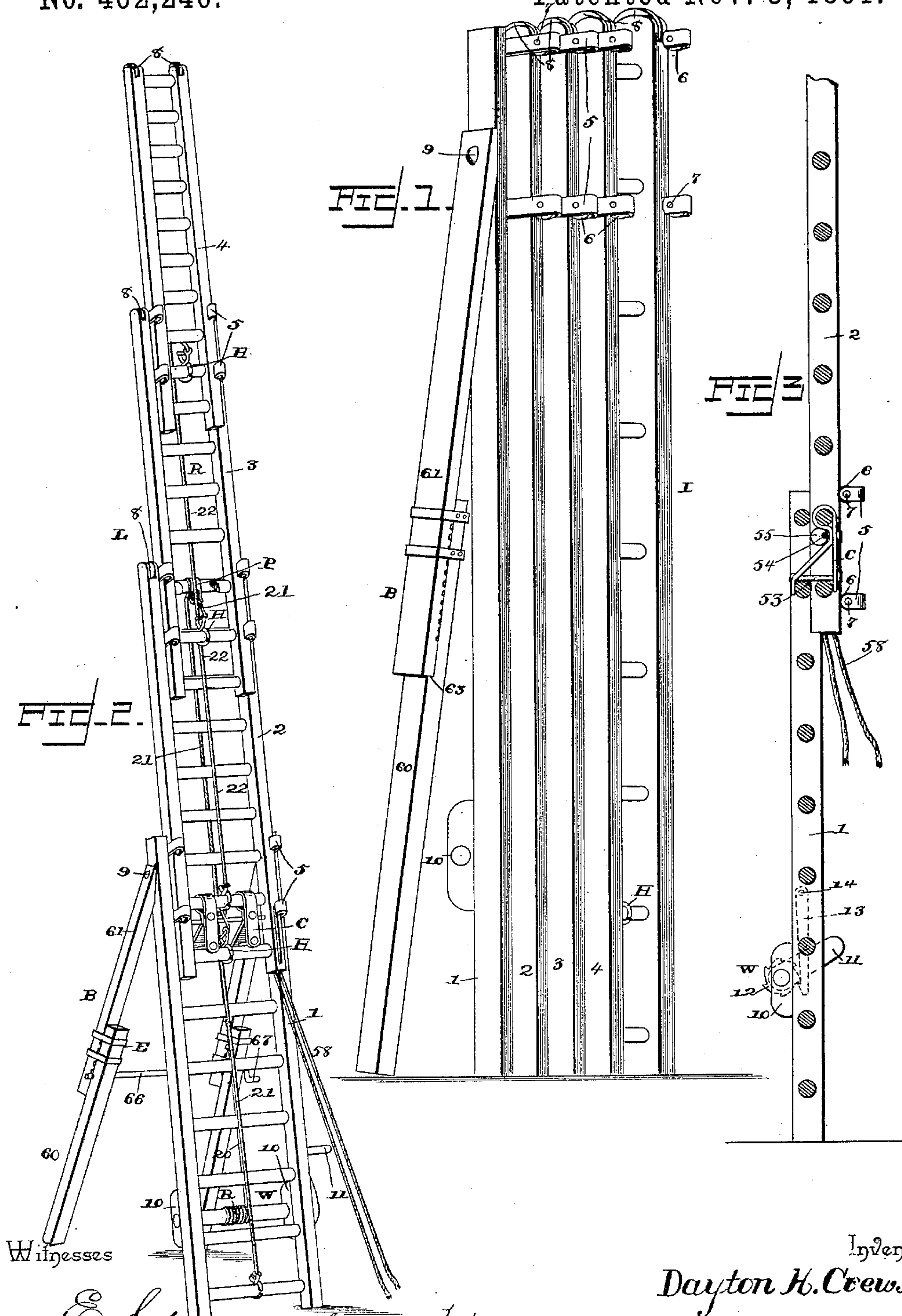
(No Model.)

2 Sheets—Sheet 1.

D. H. CREWS.
EXTENSION LADDER.

No. 462,240.

Patented Nov. 3, 1891.



Witnesses

E. S. Duval & Co.
W. L. Collamer.

By his Attorneys,

C. A. Snow & Co.

Inventor
Dayton H. Crews.

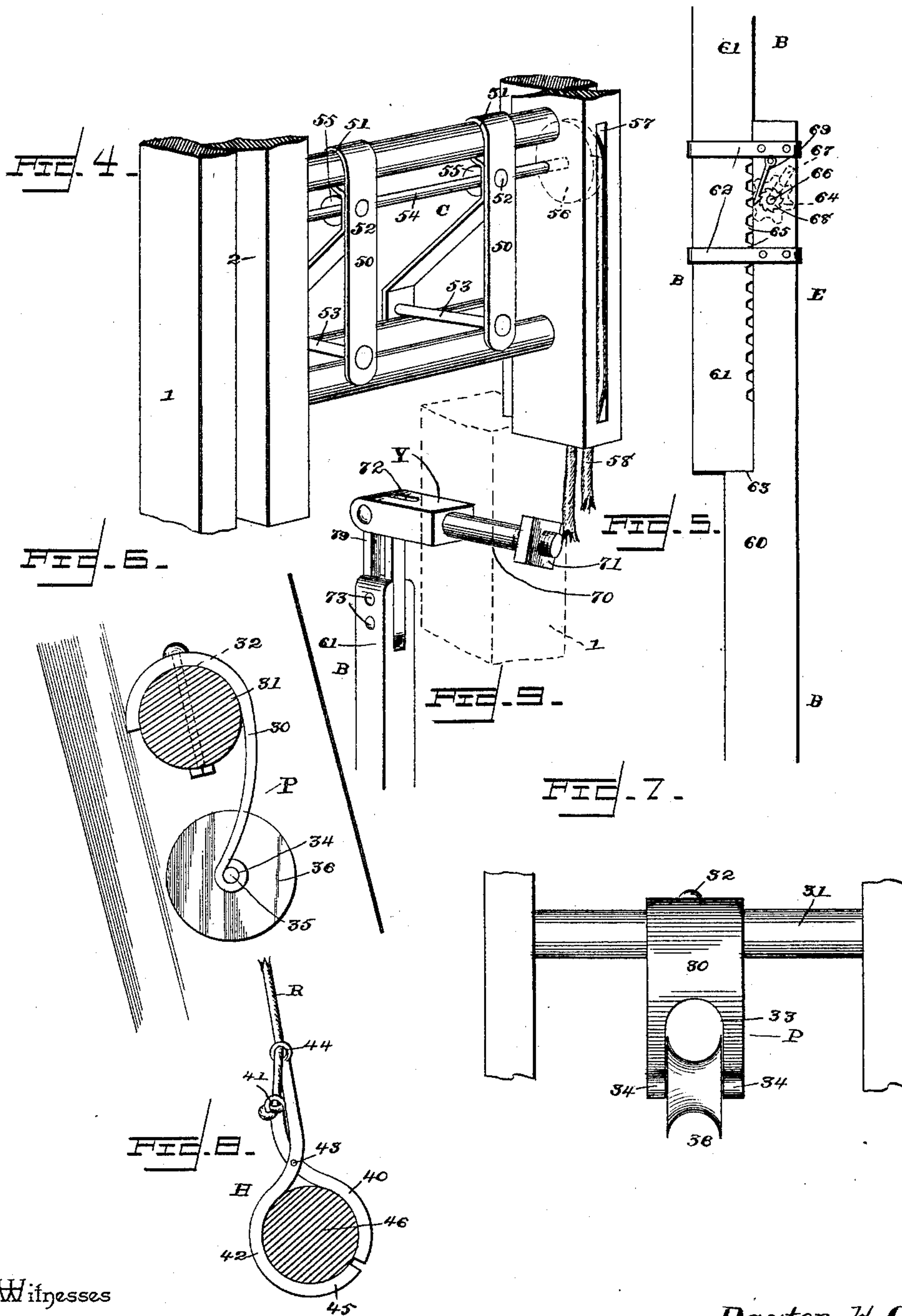
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UNITED STATES PATENT OFFICE.

DAYTON H. CREWS, OF LADONIA, TEXAS, ASSIGNOR OF ONE-HALF TO
GEORGE G. HENDERSON, OF SAME PLACE.

EXTENSION-LADDER.

SPECIFICATION forming part of Letters Patent No. 462,240, dated November 3, 1891.

Application filed April 11, 1891. Serial No. 388,506. (No model.)

To all whom it may concern:

Be it known that I, DAYTON H. CREWS, a citizen of the United States, residing at Ladonia, in the county of Fannin and State of Texas, have invented a new and useful Extension-Ladder, of which the following is a specification.

This invention relates to ladders, and more especially to that class known as "extension-ladders;" and the object of the same is to produce certain improvements therein.

To this end the invention consists in the details of construction substantially as hereinafter more fully described and claimed, and as illustrated on the two sheets of drawings, wherein—

Figures 1 and 2 are perspective views of this ladder, showing it respectively in its folded and in its distended position. Fig. 3 is a central longitudinal section of the two lower sections when distended. Fig. 4 is an enlarged perspective detail of the supporting-catch and its operating mechanism. Fig. 5 is an enlarged elevation of one of the braces, showing its distending devices. Fig. 6 is an enlarged cross-section of the upper rung of one of the ladders, showing the ladder attached thereto. Fig. 7 is a front view thereof. Fig. 8 is an enlarged side elevation of the hook, hereinafter described. Fig. 9 is a perspective detail of my preferred manner of linking the braces to the lower ladder-section.

Referring to the said drawings, the letter L designates the ladder-sections; R, the raising-rope; W, the windlass; C, the supporting-catch; P, the friction pulleys or rollers; H, the hooks; B, the braces, and E the extension devices for said braces. These parts are respectively of the following construction, to wit: The ladder is made in a number of sections (in the present instance four, designated by the numerals 1, 2, 3, and 4, (although there may be more, if desired,) the second section sliding upon the rungs and just inside the side bars of the first, and so on upwardly to the top. From the side bars of each section, near their upper ends, metallic straps 5 project forwardly and are bent inwardly over the front edge of the side bars of the section next above, small rollers or wheels 6 being mounted on pins 7 through said straps and

the tips of their bent-over portions, these rollers bearing on the side bars of the section next above and guiding the latter in its vertical movements. At the upper end of the ladder-sections there are preferably arranged guide-wheels 8, which travel against the face of a dead-wall if the ladder is leaned against the same and distended.

The means for distending this ladder consists of a windlass W, journaled in bearings 10 at the rear of the lowermost section 1, having a crank 11 upon one or both of its ends and also having a ratchet-wheel 12, as shown. A hook-shaped pawl 13 is pivoted at 14 to the side bar of the ladder and engages this ratchet-wheel, so as to prevent a retrograde movement of the windlass. A rope R is used for raising the several sections of the ladder, and this rope is itself in several sections. The lowermost section 20 is connected to the windlass W, passes thence upwardly and over a friction-pulley P, connected to the upper rung of the lower ladder-section 1, extends thence downwardly, and is connected to a hook H, which is detachably attached to one of the lower rungs of the second ladder-section 2. The second section 21 of this rope is connected in a similar manner to the lower rung of the first ladder-section 1, passes over a pulley P at the top of the second ladder-section 2, and is connected by a hook H to one of the lower rungs of the ladder-section 3. The other section 22 of this rope is similarly arranged, as shown in the drawings.

Referring now to Figs. 6 and 7, it will be seen that the friction-pulleys above referred to comprise a strap-hook 30, extending over the rung 31, which must be of iron to have the necessary strength, and connected thereto by a bolt 32, and the lower end of this hook is divided, as at 33, its extremities being formed in eyes 34, as shown. Through these eyes extends a transverse bolt or pin 35, and on this pin is journaled a grooved sheave or pulley 36, as shown.

In Fig. 8 is shown the hook H, which I preferably use. This hook comprises a short upper member 40, having an eye 41 at its upper end, and the long lower member 42, either passing through a slot in the upper member 40 or pivoted thereto at 43 in any suitable

manner, the upper end of this longer member being also provided with an eye 44, as shown. The lower end of this member is considerably elongated, as at 45, and passes under the rung 5 46, which is of iron and is seen in section. The rope R passes through the upper eye 44 of the lower member 42 and is connected to the other eye 41, and when tension is applied to the rope it is obvious that the latter will draw through the uppermost eye 44 10 and will pull the eye 41 toward it. This will cause the lower portions of the two members to come together, so as to firmly secure the hook upon the rung 46; but if it be desired 15 to disconnect this hook the rope R can be slacked and the member 40 raised to effect this end, all as will be readily understood.

In Fig. 4 is best seen, on an enlarged scale, the supporting-catch C, which I preferably 20 employ in connection with this ladder. This catch comprises a catch proper 50, (and sometimes two of them, if desired,) whose upper end has an eye 51, loosely engaging the next to the lower rung of the second ladder-section 2, whose sides are connected by a bolt 25 52 just below said eye and then diverge considerably, and whose lower ends are held distended by another bolt 53.

Journalled in the side bars of this ladder-section is a horizontal shaft 54, upon whose 30 body is eccentrically mounted a wheel or cam 55, which operates beneath the upper bolt 52, and upon whose end is keyed a grooved wheel 56, preferably mounted in an opening 57 in the side bar of the ladder. Over this wheel 35 passes an operating-rope 58, which is connected at one point to the wheel and whose lower ends lead down to within reach of an operator standing on the ground. When one end 40 of this rope is drawn upon, the shaft 54 is so turned that the cam 55, striking behind the bolt 52, throws the catch 50 forwardly and moves its lower bolt 53 over the lower rung of this second ladder-section. When the 45 other end of the rope is drawn upon, the cam is turned in the other direction, so as to permit the catch 50 to swing to the rear, and the lower bolt 53 is therefore allowed to swing over one of the rungs of the lower ladder-section 50 1, so that when the second ladder-section 2 is allowed to drop back a little this catch will positively support it from one of the rungs of the lower ladder-section.

In Fig. 5 is shown to the best advantage 55 one of the inclined braces B, which I preferably employ for supporting this ladder when it is to be used at a point where the upper end of the upper section will not rest against a support. Each of these braces consists of 60 a main or stationary section 60, whose lower end rests upon the ground, and an upper or sliding section 61, which moves beneath strong iron straps 62, secured to the main section, and whose upper end is pivoted, as at 9, to 65 the section 1. The main section 60 preferably has a notch 63, against which the lower end of the sliding section rests, although the

two sections may be slightly distended, if desired, by the means described below and 70 broadly lettered E. However, it will be understood that a very slight distention of these braces will effect considerable movement of the upper end of the upper ladder-section, and hence it is not necessary that the two sections 75 of the brace have as much relative movement as the several sections of the ladder. The extension device E for the members of this brace comprises a gear-wheel 64, which engages 80 teeth 65, formed upon one end of the upper or sliding section 61. This gear is mounted upon a shaft 66, having a crank 67 at one end and also provided with a ratchet-wheel 68, which is held against retrograde movement 85 by a hook-shaped catch 69, all substantially the same as the windlass W, above described, with the exception that instead of winding up a rope the shaft turns a gear-wheel, which engages a rack-bar on the sliding member.

With the above construction of parts the ladder in its folded condition, Fig. 1, may be 90 carried upon the hook-and-ladder truck or upon other suitable support to the point where it is desired to use it, when it is taken from the support and placed in position with the lower end of the lower section upon the 95 ground. The braces B are then carried outwardly and the extensions E operated to incline the lower section at the proper angle. The windlass W is then operated, and the rope R causes the ladder to be distended in 100 manner above described. When the upper section has reached the desired height, one end of the rope 58 is drawn upon to cause the catch C to swing to the rear, whereby the second ladder-section is positively held in 105 elevated position, and the other sections will be held by the various sections of the rope R.

Considerable change may be made in the details of construction without departing 110 from the spirit of my invention. For instance, other braces than those shown may be used and the extensions E may be omitted. The catches C may also be omitted, if desired; but I prefer to employ them, as above 115 described. Other means than that shown may be used for operating these catches, and various minor additions to and changes in the arrangement of parts may be made from time to time as experience and fancy may 120 dictate.

In Fig. 2 the bars B are shown connected 125 at their upper ends by an ordinary bolt 9 with the lower ladder-section 1; but in Fig. 9 I show the preferred manner of making this connection. This consists of a Y-shaped 130 yoke Y, whose shank 70 extends through the ladder-section 1 and is held in place by a nut 71, and in whose bifurcated end 72 is pivoted a link 79, which is bolted, as at 73, to the upper end of the upper section 61 of the inclined brace, thereby keeping said brace at the rear of and in alignment with the lower ladder-section.

In Fig. 5 the extension devices E for ad-

justing the two members of the brace are shown as independent in the two braces; but in Fig. 2 the rod 66 extends across from one brace to the other, and the turning of a single handle 67 operates both sections or braces simultaneously.

What is claimed as new is—

1. In an extension-ladder, the combination, with the lower section, an upper section sliding thereon, and means for raising the upper section, of a catch having an eye at its upper end pivotally mounted on one of the lower rungs of the upper section, its lower end being adapted to engage the rungs of the lower section, a horizontal rod journaled in the side-bars of the upper section, a cam-wheel eccentrically keyed on said rod beneath the catch, a grooved wheel also keyed on said rod, and a rope connected to and passing over said wheel and into the ground, as and for the purpose set forth.

2. In an extension-ladder, the combination, with two sliding sections, of a windlass secured to the lower section, a rope leading therefrom over the upper rung of this section, and a hook secured to the other end of said rope and engaging the lower rung of the upper section, said hook comprising members 40 and 42, pivotally connected at 43 and

respectively provided with eyes 41 and 44 in their upper ends, the rope extending through the eye 44 and being connected to the eye 41, and the lower end of the member 42 being curved, as at 45, so as to pass beneath the rung, as and for the purpose set forth.

3. In an extension-ladder, the combination, with two sliding sections detachably connected, of a windlass secured to the lower section, a hook detachably bolted to the upper rung of this section and carrying a grooved sheave at its lower end, over which sheave said rope passes, and another hook comprising two members pivotally connected between their ends and having eyes in their upper extremities, through one of which said rope passes and to the other of which it is connected, and the lower extremity of one member being curved so as to pass beneath the lower rung of the upper ladder-section, as and for the purpose set forth,

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

DAYTON H. CREWS.

Witnesses:

S. M. FOSTER,
CHAS. LEWIS.