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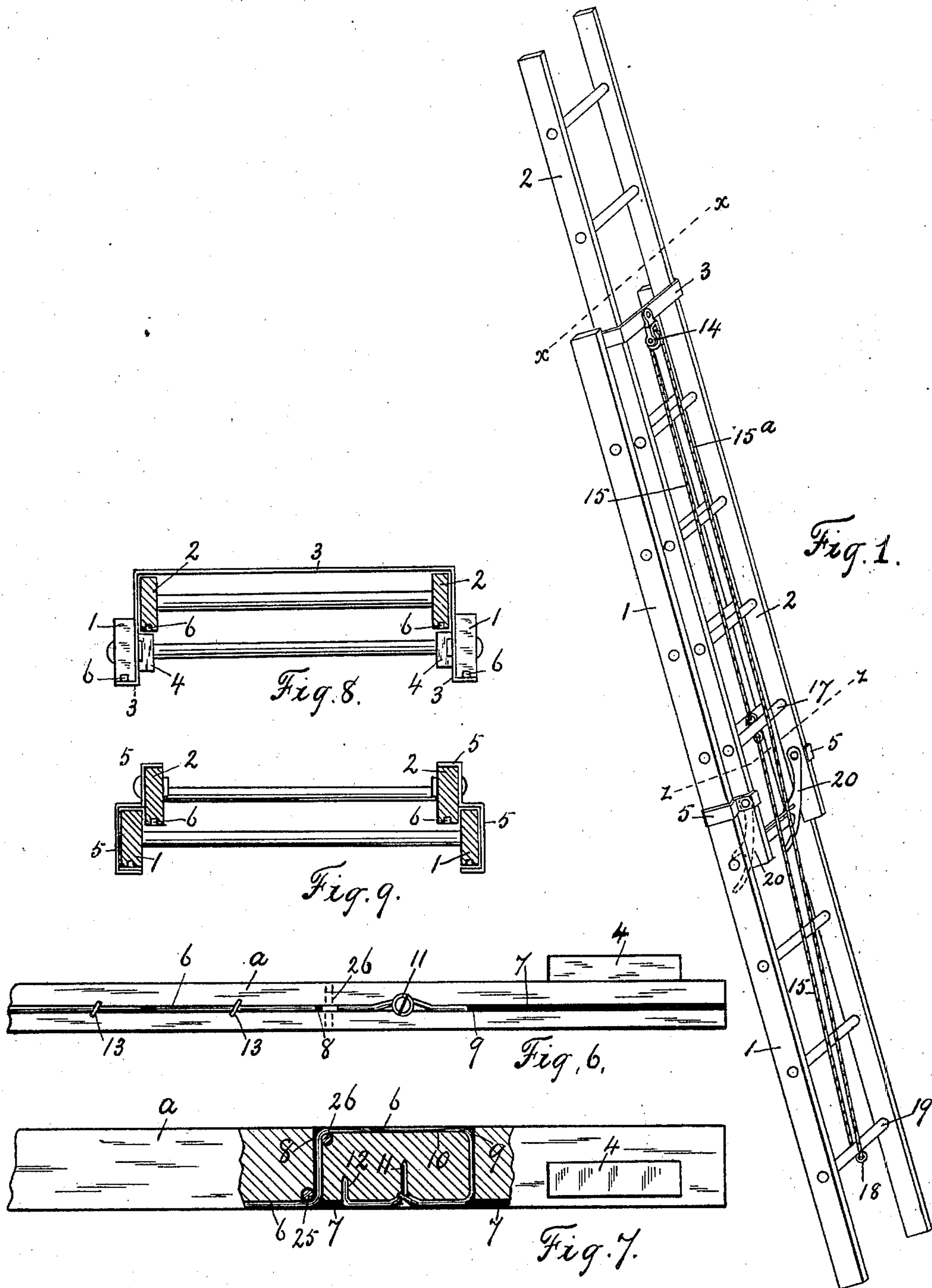
S. T. WAGGONER.

AUTOMATIC LOCKING EXTENSION LADDER.

(Application filed Mar. 18, 1901.)

(No Model.)

2 Sheets—Sheet 1.



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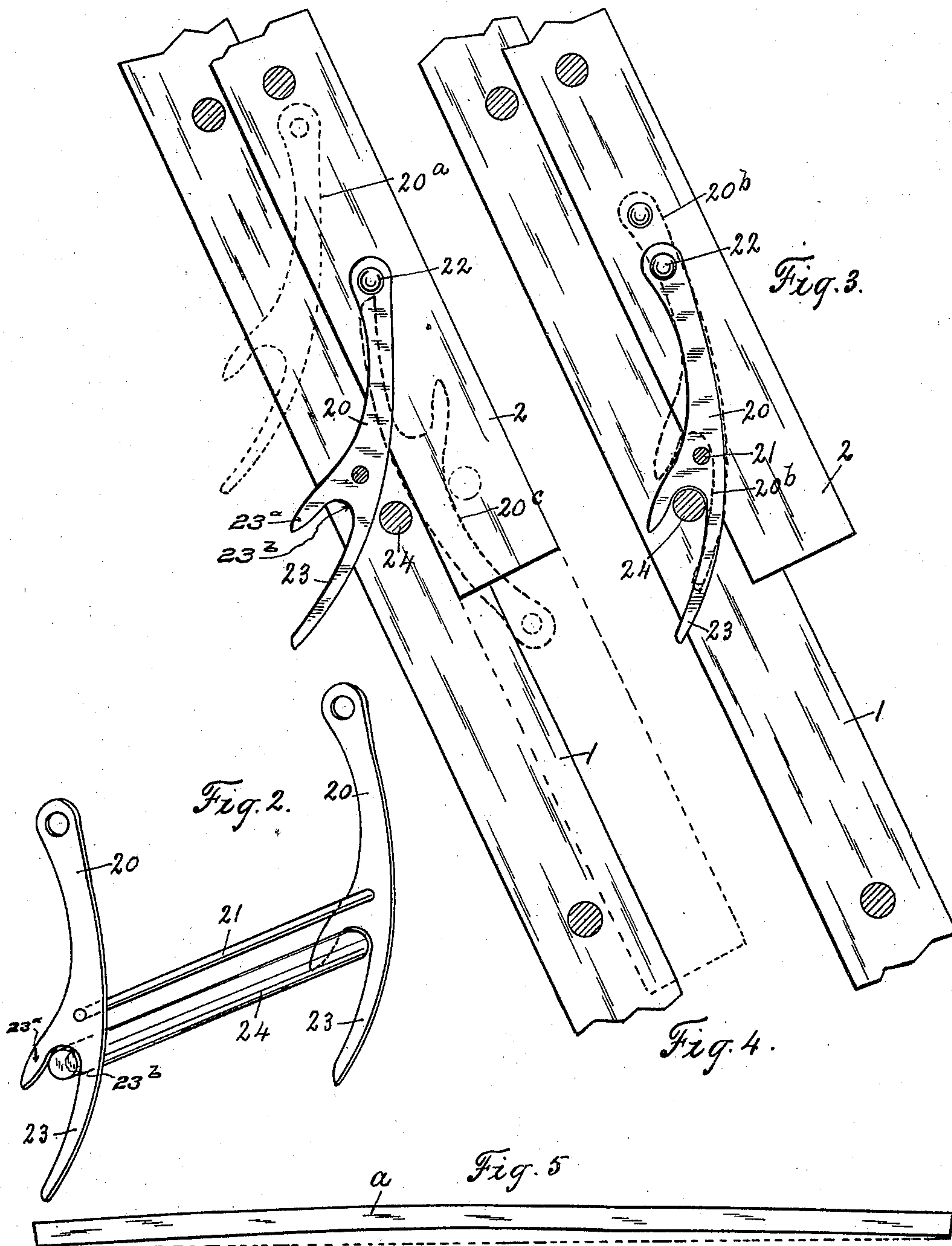
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# UNITED STATES PATENT OFFICE.

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CHARLES W. SMITH, OF LONDON, CANADA.

## AUTOMATIC-LOCKING EXTENSION-LADDER.

SPECIFICATION forming part of Letters Patent No. 687,945, dated December 3, 1901.

Application filed March 18, 1901. Serial No. 51,663. (No model.)

*To all whom it may concern:*

Be it known that I, SAMUEL T. WAGGONER, a citizen of the United States, and a resident of the city of London, in the county of Middlesex, in the Province of Ontario, Canada, have invented certain new and useful Improvements in Automatic-Locking Extension-Ladders, of which the following is a specification.

This invention consists of the improved construction and novel combination of parts, as will be hereinafter first fully set forth and described and then pointed out in the claims, the object being to provide a simple, strong, durable, inexpensive, and efficient device of the class described and one so constructed that when required the movable ladder-section may be readily, easily, and instantly adjusted perfectly free up or down lengthwise on the stationary ladder-section and also so constructed that when required said movable ladder-section may be automatically locked at any position or elevation desired on said stationary ladder-section.

Reference is had to the accompanying drawings, wherein—

Figure 1 is a perspective view of my improved automatic-locking extension-ladder. Fig. 2 is an enlarged detail perspective view of the automatic-locking pawl. Fig. 3 is a central section of a short portion of the ladder, illustrating the automatic operation of the pawl when locking the adjustable section on the stationary section. Fig. 4 is another view of same, illustrating the automatic operation of the pawl when the adjustable section is lowering freely on the stationary section. Fig. 5 is a detail side elevation of one of the side bars of the ladder. Fig. 6 is an enlarged detail edge view of a short portion of one end of same. Fig. 7 is an enlarged detail side view of same, partly in section. Fig. 8 is a cross-sectional view of the ladder-sections on the line  $x x$  of Fig. 1. Fig. 9 is another cross-sectional view of same on the line  $z z$  of Fig. 1.

In the accompanying drawings the numeral 1 designates the lower or stationary section, and 2 the upper or adjustable section, of the ladder. 3 designates a strap which extends outward from, bridges the space between, and is secured at its ends to the side bars  $a a$  of said stationary section 1 and near the upper

end of the latter, and 4 4 designate blocks which are also secured on the adjacent sides of and near the upper end of said side bars  $a a$  of said stationary section, between which blocks 4 and the strap 3 said adjustable section 2 is held against and guided in line with said stationary section 1 as said adjustable section is raised or lowered.

5 5 designate guiding-straps which are secured opposite one another to the side bars  $a a$  of the adjustable section 2, the ends of which straps clasp both sections, as shown in Fig. 9, for the purpose of further holding the adjustable section 2 against and guiding it in line with the stationary section 1 as said adjustable section is raised or lowered, and these straps 5 5, together with the strap 3 and blocks 4, securely hold said adjustable section 2 against and guide it in line with said stationary section 1 at two separate points, thus avoiding and completely preventing the accidental disengagement of said movable section from said stationary section.

6 designates a truss rod or wire which is secured in a groove or recess 7, formed in the under side of each of the side bars  $a$  of the ladder-sections 1 and 2, as shown particularly in Figs. 6 and 7, and in each end of each of said side bars  $a$  of the ladder-sections 1 and 2 the openings 8 and 9 are formed, which openings extend through said side bars from the under to the upper side, and 10 designates an elongated groove or recess formed in the upper side of each of said side bars between the openings 8 and 9. 11 designates a screw secured in the under side of said side bar about midway between said openings 8 and 9, and 25 and 26 designate pins, which are secured in and extend across said side bar on opposite sides of said opening 8, and a portion of said pins projects slightly into said opening 8, as shown in Fig. 7, so that by bending each of the side bars  $a$  slightly, as shown particularly in Fig. 5, by any suitable bending device (not shown, as it is no part of my invention) and after bending said side bars inserting the end of the truss rod or wire 6 through the opening 8, then along in the upper groove or recess 10, then back through the opening 9 and back in the groove or recess 7 and twisting said wire around the screw 11, and then forming



an angular end 12 on the end of said truss rod or wire and driving said angular end into the side bar *a*, as shown particularly in Fig. 7, when the opposite ends of the truss rod or wire are secured to the opposite ends of the side bar *a*, as just described, (the truss rod or wire being stretched as tightly as possible between its ends before securing its ends, as described,) immediately on releasing the side bar *a* from the pressure of the device which bends or curves it its resilience will cause it to partly return to its normal position. This will tightly stretch said truss rod or wire and bed it tightly in the groove 7 in said side bar *a*, and the abutting of the truss rod or wire 6 against the pins 25 and 26, where it extends through the opening 8, said pins will prevent said truss rod or wire from being forced into said side bar by the resilience of the latter when released from the pressure which bends or curves it, and thus avoid and completely prevent said truss rod or wire from splitting or otherwise injuring said side bars at this point. 13 13 designate staples, which are driven into said side bar *a* over said truss rod or wire 6, and thus staple it to said side bar to further assist in holding and retaining said truss rod or wire 6 in the groove 7 or tightly against said side bar.

14 designates a pulley secured to the strap 3, and 15 a rope or flexible band which extends over said pulley 14, and one end of said rope is secured to the rung 17 or otherwise to the adjustable section 2, and preferably near the lower end of the latter, and the other end of said rope extends downward to and through a loop or eye 18, secured to the rung 19 of the stationary section 1, and then extends upward and is secured to the rung 17 or otherwise to said adjustable section 2, so that by grasping the rope 15 by the portion 15<sup>a</sup> and drawing it downward the adjustable section 2 of the ladder will move upward on said stationary section.

In connection with the above mechanism I employ a pair of pawls 20, of like construction, each of which is pivoted at its upper end at 22 to the side bar of the movable ladder-section and preferably to the inner face of such bar. The pawls stand opposite each other and are rigidly connected by any suitable means. In the present instance I have shown a rod 21, connecting their bodies, by which means they are caused to operate in unison. The body of each pawl is preferably struck on a single curve throughout its length, and at its lower end it is provided with a long finger 23 in front and a short finger 23<sup>a</sup> in rear, between which is a deep notch 23<sup>b</sup>, which by its shape and by reason of the greater weight of the finger 23 at one side of the center of gravity does not open straight downward from the pivot 22 when the pawl hangs in its normal position, but inclines slightly to the rear, and the position of said notch is such that if

projected on a straight line it would not pass through the pivot 22.

The operation is as follows: By grasping the portion 15<sup>a</sup> of the rope and drawing downward thereon the movable section 2 of the ladder will be raised, as well as the pawls 20, the latter riding upward freely over the rungs of said ladder-sections, and, again, by raising said adjustable section 2 until the pawls 20 are in the position shown by dotted line 20<sup>a</sup> in Fig. 4 they will, when the rope is released to permit the adjustable section 2 of the ladder to lower by its own weight, be carried downward by said adjustable section 2 and ride freely over the rungs of said ladder-sections, as shown in Fig. 4; but by drawing downward on the portion 15<sup>a</sup> of the rope until the finger 23 of said pawl 20 rests against the rung 24, as shown by dotted line 20<sup>b</sup> in Fig. 3, and then releasing the rope the movable section 2 by its own weight will lower, and said elongated arm or finger 23 will guide said pawl so that said rung 24 will engage with the notch 23<sup>b</sup> of said pawl 20, as shown by solid line in Fig. 3, and this will automatically lock the adjustable section 2 of the ladder at this elevation. Again, by drawing downward on the portion 15<sup>a</sup> of the rope until the finger 23 clears the rung 24, as shown by dotted line 20<sup>a</sup> in Fig. 4, the pawl, being weighted on one side by the finger 23<sup>a</sup>, will swing inward until the point of the finger 23 will project inward beyond the rung 24. When in this position, by releasing the rope the movable section 2 by its own weight will lower and the pawl 20 when passing between the rungs of said sections when opposite one another will be in the position shown at 20<sup>c</sup> in Fig. 4, and this will permit the pawl to clear and ride freely over said rungs and the adjustable section 2 to lower freely until at the point desired, when by drawing up on the rope 15, as before described, until the finger 23 of the pawl 20 engages with the rung 24, as shown by dotted line 20<sup>b</sup> in Fig. 3, said pawl will engage with said rung, as before described, and automatically lock and firmly and securely hold said adjustable section 2 at said point or elevation or at any point or elevation desired. Thus by the use of my improvements the opposite ends of the truss rod or wire will be firmly and rigidly secured to the opposite ends of the side bars *a* of the ladder-sections 1 and 2, and said side bars being bent slightly and provided with said truss rods or wires and with the pins 25 and 26 will be made very strong and durable, and by means of said straps 3 and 5 and blocks 4 said movable section will be held securely against and guided as it is adjusted upward or downward on said stationary section, and by means of said double pawls, provided with said fingers, the movable section 2 may be readily, easily, instantly, and rigidly locked at any desired position or elevation on said station-



ary section, or said movable section may be adjusted upward or downward perfectly free on said stationary section, as desired, and at the same time a simple, strong, durable, inexpensive, and efficient device of the class described is provided.

I have found by experiment that the construction herein shown and described gives the best results. At the same time, while I prefer said construction, I do not wish to limit myself to the details thereof, as they may be modified in various ways without departing from the spirit of my invention.

Having thus described my invention, I claim—

1. In a device of the class described, a side bar in which the openings, 8, and, 9, are formed, and a screw, 11, secured in said side bar, in combination with a truss rod or wire, 6, extending through said openings, 8, and, 9, and twisted around said screw, substantially as and for the purpose set forth.

2. In a device of the class described, a side bar in which the openings, 8, and, 9, are formed, a screw, 11, and pins, 25, and, 26, secured in said side bar, in combination with a truss rod or wire, 6, extending through said openings, 8, and 9, and twisted around said screw, substantially as and for the purpose set forth.

3. In a device of the class described, a side bar in which the openings, 8, and, 9, are formed, in combination with a truss rod or wire, 6, formed with an angular end, 12, said truss rod or wire extending through said openings, 8, and 9, and its angular end, 12, driven into said side bar, substantially as and for the purpose set forth.

4. In a device of the class described, a side bar in which openings, 8, and, 9, are formed, and a screw, 11, secured in said side bar, in combination with a truss rod or wire, 6, formed with an angular end, 12, said truss rod or wire extending through said openings, 8, and, 9, twisted around said screw, and its angular end, 12, driven into said side bar, substantially as and for the purpose set forth.

5. In a device of the class described, a side bar, in which openings, 8, and, 9, are formed, and pins, 25, and, 26, secured in said side bar, in combination with a truss rod or wire, 6, formed with an angular end, 12, said truss rod or wire extending through said openings,

8, and, 9, and its angular end, 12, driven into said side bar, substantially as and for the purpose set forth.

6. In a device of the class described, a side bar, in which the openings, 8, and, 9, are formed, and a screw, 11, and pins, 25, and, 26, secured in said side bar, in combination with a truss rod or wire, 6, formed with an angular end, 12, said truss rod or wire extending through said openings, 8, and, 9, twisted around said screw, and its angular end, 12, driven into said side bar, substantially as and for the purpose set forth.

7. In a device of the class described, a side bar, in which the grooves, 7, and, 10, and openings, 8, and, 9, are formed and a screw, 11, and pins, 25, and, 26, secured in said side bar, in combination with a truss rod or wire, 6, formed with an angular end, 12, said truss rod or wire extending in said groove, 7, through said opening, 8, in said groove, 10, through said opening, 9, twisted around said screw and its angular end driven in said side bar, substantially as and for the purpose set forth.

8. In a device of the class described, a stationary ladder-section, in combination with a second ladder-section movable thereon, and a pawl made in one piece struck in a single curve throughout its length, the pawl being pivoted at its upper end to said movable section and having at its lower end long and short fingers with a notch between them which if projected on a straight line would not pass through the pivot, the whole for operation substantially as described.

9. In a device of the class described, a stationary ladder-section, in combination with a second ladder-section movable thereon, and a pawl having a body struck in a single curve and pivoted at its upper end to said movable section and having at its lower end two fingers with a notch between them which if projected on a straight line would not pass through the pivot, the whole substantially as described.

In testimony whereof I have signed in the presence of the two undersigned witnesses.

SAMUEL T. WAGGONER.

Witnesses:

P. J. EDMUNDS,  
M. BRAUND.