2 Sheets--Sheet 1.

D. SANFORD.

Fire-Escape Ladders.

No. 158,984. Patented Jan. 19, 1875.

Fig. 1

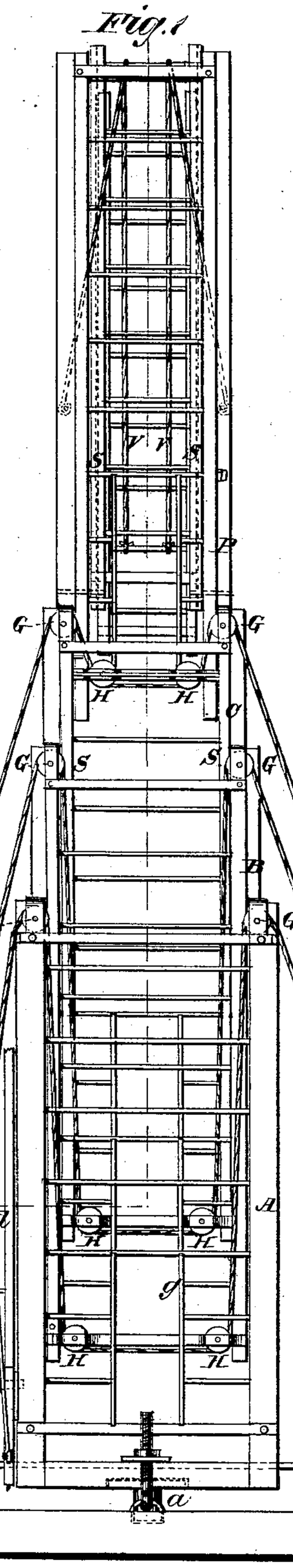
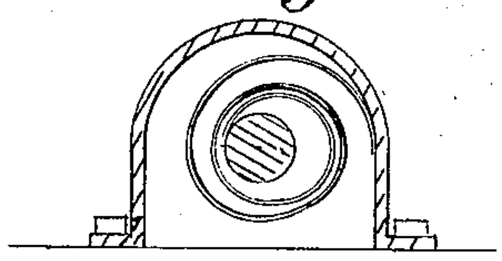


Fig. 4.



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2 Sheets--Sheet 2.

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Fire-Escape Ladders.

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Fig. 3

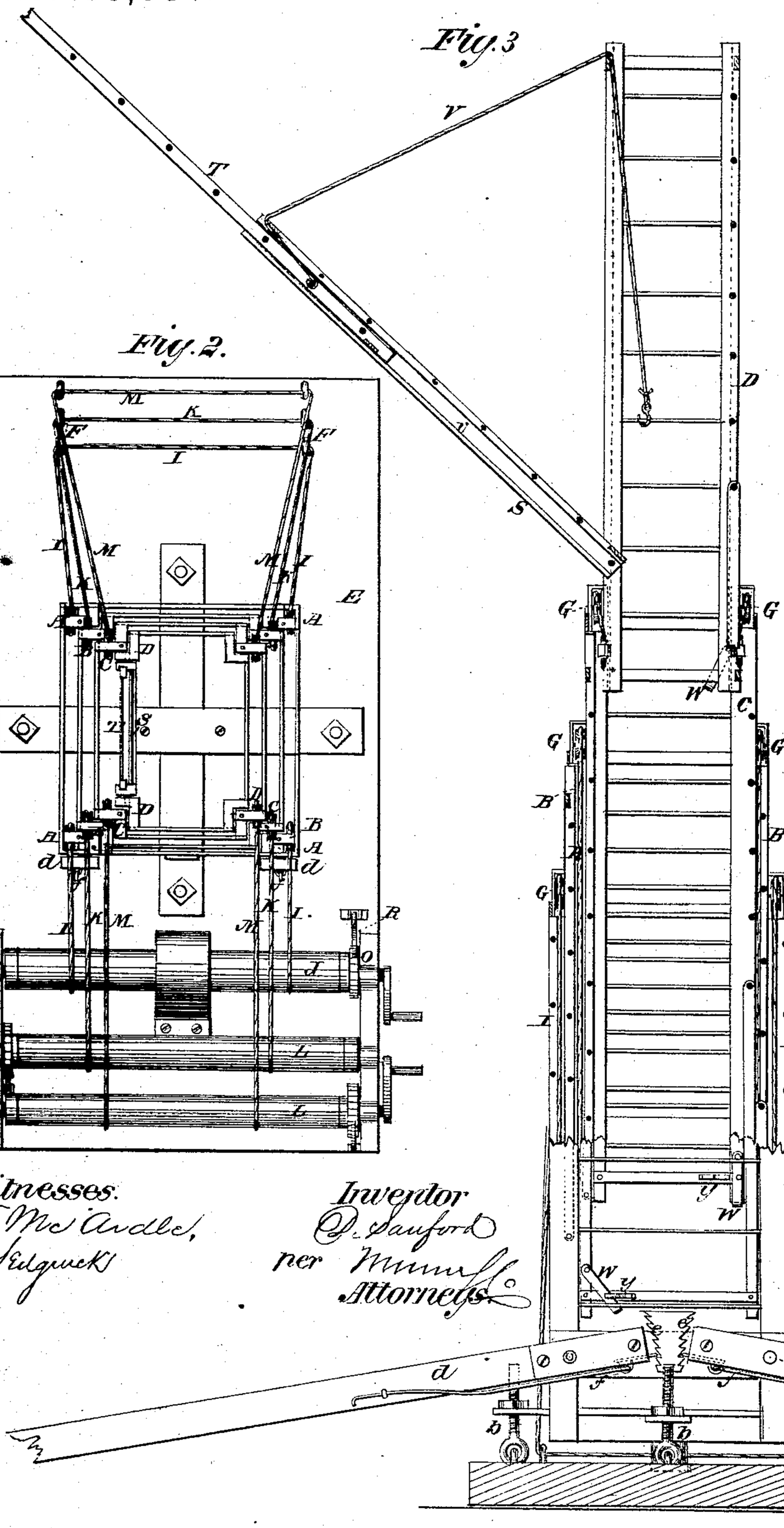

Fig. 2.

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UNITED STATES PATENT OFFICE.

DAVID SANFORD, OF ASHTON, ILLINOIS.

IMPROVEMENT IN FIRE-ESCAPE LADDERS.

Specification forming part of Letters Patent No. **158,984**, dated January 19, 1875; application filed July 25, 1874.

To all whom it may concern:

Be it known that I, DAVID SANFORD, of Ashton, in the county of Lee and State of Illinois, have invented a new and Improved Extension-Ladder and Fire-Escape, of which the following is a specification:

My invention relates to a vertical extension-ladder having a coiled spring, combined with the windlass of the lower movable section, which winds up when the section descends, to counteract the weight of all of the movable sections, and assist in raising and lowering them. The movable sections have one side arranged on pivots at the lower end, to swing out against the side of a building, and the upper swinging ladder thus formed has a sliding extension, so connected by cords with the main portions that it is caused to slide out when it swings to the building.

Figure 1 is a side elevation of my improved extension-ladder and fire-escape. Fig. 2 is a top view. Fig. 3 is partly a side elevation and partly a sectional elevation, and Fig. 4 is a cross-section of the coiled counterbalance-spring and its case.

Similar letters of reference indicate corresponding parts.

A is the stationary bottom section; B, C, and D, the movable sections, the former being attached to the platform E, and the latter being arranged to slide up and down—one within another—and operated by a rope and windlass, the ropes being fastened to the platform at one side of the ladder, as at F, and passing over pulleys G at the top of the section, which serves for the support for hoisting the section within it under the pulleys H in the lower end of the section to be hoisted, and thence to the windlass. I is the rope, and J the windlass, for the lower movable section B; K, the rope, and L the windlass, for the next section, C; and M, the rope, and N the windlass, for the top section, D. The windlass J has a strong coiled spring applied to it in a case, P, to counterbalance the weight, and it has a ratchet wheel, Q, and pawl R, for holding the spring when the ladders are down. S represents the ladders in one side of each section, for swinging down from the top against the side of a building; and T, the extension of the upper swinging ladder, sliding in grooves in the part S. V represents ropes connected to the bottom of the sliding section T, and passing up over the top rung of S, and to the top of section D, so as to serve for braces, and at the same time to force the extension out. W represents the spring-stops on the lower end of each movable section, for springing out over the rungs X as they rise above them to rest on them, and assist the ropes in holding the sections up.

To let the sections go down without hinderance by these stops, they are sprung back and swing under guards Y, which hold them out of the way.

The bottom section rests on a pivot, *a*, and the adjusting-screws *b*, by which it can be righted quickly in case the platform does not stand level, or in case it is required to incline the ladders. *d* represents braces pivoted to the bottom section, and provided with ratchets *e* and stop-catches *f*, for holding them at any point after the braces have been adjusted, with the outer ends against any object. Any required number of these braces may be used.

Each section has an opening, *g*, through one side, at the bottom, to admit persons for ascending and descending inside of the sections, where they will be safer than outside.

This hollow-square form of ladder will be very useful in carrying the hose up and down, as four persons can climb the ladder and lift the hose at once.

When the lower movable section is to be elevated, the windlasses L and N will be let free to allow the ropes K M to unwind, and N will be let free when the middle section is raised.

Lateral ladders may be applied to all of the sections, and each section may have a spring in combination with its windlass, to assist in raising it.

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

1. The combination of a coiled spring with

the windlass of an extension-ladder, to counterbalance the weight of the ladder, substantially as specified.

2. The swinging ladder S, sliding extension T, and ropes U, combined and arranged with an extension-ladder, substantially as specified.

3. The combination of braces *d*, ratchets *e*, and catch-pawls *f* with the ladder, substantially as specified.

DAVID SANFORD.

Witnesses:
J. B. WILLIAMS,
F. W. MIX.