A. H. MIDDLETON.
Ladder.

No. 198,897. Patented Jan. 1, 1878.

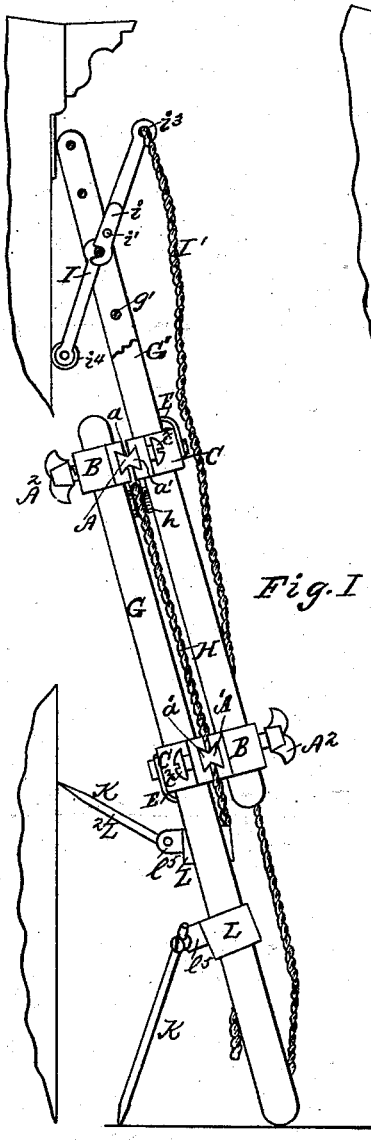

Fig. I

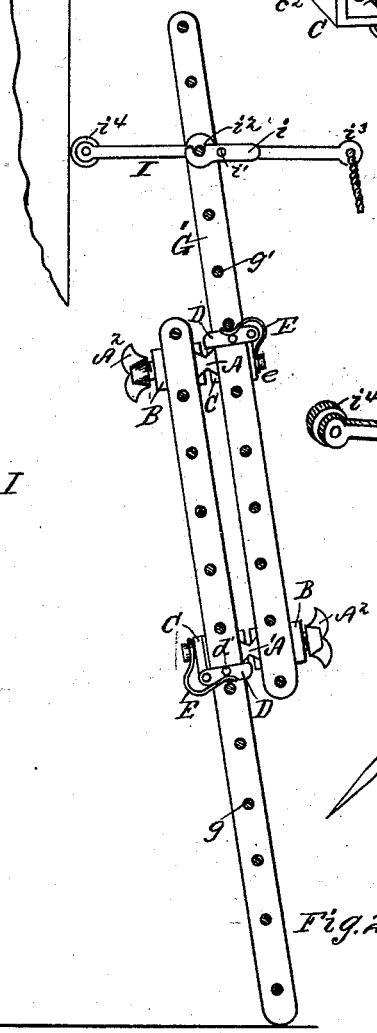

Fig. 2

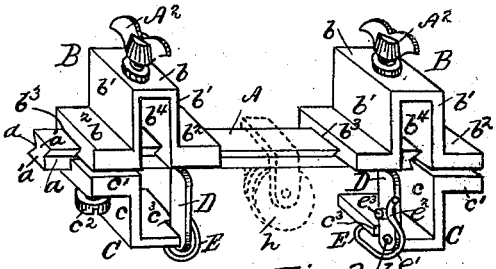

Fig. 3

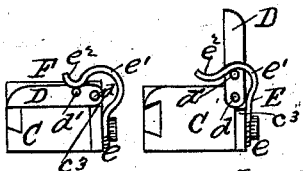

Fig. 4

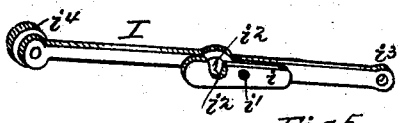

Fig. 5

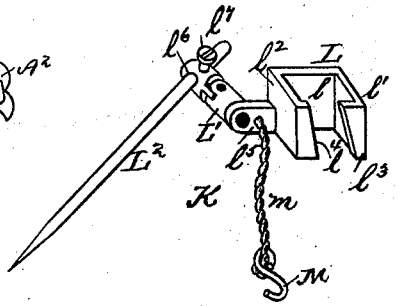

Fig. 6

WITNESSES:

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ARTHUR H. MIDDLETON, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN LADDERS.

Specification forming part of Letters Patent No. **198,897**, dated January 1, 1878; application filed October 2, 1877.

To all whom it may concern:

Be it known that I, ARTHUR H. MIDDLETON, of the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Firemen's Ladders; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification, in which—

Figure 1 is a side elevation of two ladders connected together by the devices which constitute my invention. Fig. 2 is a transverse vertical section of the same. Fig. 3 is a perspective of my invention; Fig. 4, detail view; Fig. 5, a perspective of the lever I, and Fig. 6 a perspective of the braces K.

The object of my invention is to provide means whereby two or more ordinary firemen's truck or other ladders can be joined together, so as to make an extension-ladder which is easily and safely manipulated, combined with great safety secured in operating the same.

It consists, essentially, in the provision of a grooved cross-bar, on which are mounted sliding brackets, through which the sides of the ladders pass, the latter being firmly and securely held therein on their alternate sides and ends by means of set-screws. One set of said brackets is provided with pivoted pawls, which engage with the rounds of each section of the ladder, and have three points of support—viz., one on the cross-bars, one on their pivotal connections, and the other on the bracket to which they are pivoted—and form safety-catches, for effectually preventing the ascending section of the ladder from accidentally falling.

My invention further consists in the provision of removable levers, which are intended to be attached to one of the rounds of the upper section of the ladder, and are operated so as to raise the ladder out from the wall a sufficient distance to clear the cornice or other obstruction, and allow it to be still farther extended, so as to reach beyond said cornice or obstruction.

My invention still further consists in the provision of removable braces, which are attached to the ladder when it is fully extended and in position against the wall of a building. These braces retain the ladder in an upright and fixed position.

My invention still further consists in the peculiar combination, construction, and arrangement of parts, as hereinafter more fully set forth.

Referring to the accompanying drawing, A A^1 are cross-bars, which are provided on two of their opposite sides with **V** or equivalent shaped grooves *a a*, thereby forming a bar, having double dovetails a' a'.

B B are brackets, composed of the top piece *b* and sides b^1 b^1, forming open chambers b^4 b^4. The latter are provided with flanges b^2 b^2, on the under side of which, and longitudinally with the brackets, are dovetail grooves b^3 b^3, which correspond to the form of the dovetails a' a' in the cross-bars A and A^1.

C C are also brackets, formed with **L**-shaped pieces *c c*, which pass around the sides of the sections of the ladder. To said pieces *c c* are attached or formed thereon the flanges c^1 c^1, having the dovetail grooves formed on the under side of the same in the direction of their length, said flanges being provided with set-screws c^2 c^2.

The brackets B B and C C are, respectively, mounted on the upper and lower dovetails a' a' of the cross-bars A and A^1, so as to slide easily thereon, and allow of ready adjustment for different widths of ladders.

The brackets C C are provided with pawls D D, pivoted thereto at *d d*, in such a manner that the square edges c^3 c^3, formed on the brackets C C, as shown, prevent said pawls from being moved downward from a horizontal position, said square edges also forming supports for the pawls when the latter are sustaining the weight of the extended sections of the ladder, and any other weight that may be put upon the same. E E are springs, fastened to said brackets C C at *e e*. They are formed with **U**-shaped curves e^1 e^1, as shown in Figs. 2, 4, and 3, the extremities of which end in short reverse curves e^2 e^2. The object of these curves is as follows, viz: When the pawls are in a horizontal position, as shown at F in Fig.

4, the short curves e^2, resting upon the projecting fingers d' d' on the pawls D D, press the same down upon the rounds of the ladder. When said pawls are thrown up to a vertical position, as is necessary to be done in separating the sections of the ladder, the short curves e^2 e^2 slide forward over the said projections d' d', and allow the large curves e^1 e^1 to engage with the same, as shown, thereby retaining said pawls in a vertical position, and offering no obstacle to the quick separation of the sections of the ladder.

The operation is as follows: The brackets B B and C C are placed in position upon the cross-bars A and A^1, on opposite sides of the same. The latter are then adjusted to the width of the ladder-section intended to be used, and are then securely fixed in position on the cross-bars A and A^1 by the set-screws c^2 c^2. Before attaching these cross-bars A A^1 to the sections of the ladder, the pawls D D are first adjusted from a horizontal to a vertical position, and in such position as described by the springs E E. The upper part of the section G is then passed through the chambers b^4 of the brackets B B on the cross-bar A, and securely fastened thereto by the thumb-screws A^2 A^2, the cross-bar A resting on one of its ungrooved sides on the upper side of said section G of the ladder. The lower part of another section, G′, of the ladder is now passed into the brackets B B on the cross-bar A^1, and secured thereto in like manner by the thumb-screws A^2, with the cross-bar A^1 resting on one of its ungrooved sides on the lower side of said section. These sections are connected together by passing their free ends through the brackets C C, the cross-bars A A^1 being between and resting on the sides of said sections, as shown, thus forming means whereby the sections of the ladders are extended without any unnecessary friction.

The ladder is now extended by means of the rope H, which is secured at one extremity in the cross-bar A, and then passing upwardly and over the pulley h, attached to the cross-bar A, the pawls D meanwhile being adjusted so as to resume a horizontal position. As the section G′ is extended, said pawls D D, attached to the brackets C C on the cross-bar A^1, meet in succession each one of the rounds g of the section G, and are depressed from their horizontal to nearly a vertical position. Said section, still ascending, carries said pawls above the round, and they then, under the influence of the springs E E, resume their original position between the said round g g and the next one above. At the same time the pawls D D on the brackets C C on the cross-bar A are, in succession, met by the rounds g' g' of the section, and are raised by the same to nearly a vertical position, whence, passing over said rounds, they are brought back by the springs E E to their horizontal position between said round and the next one below. This position and operation of the pawls forms a strong support for the sections of the ladder when completely or partially extended, the said pawls being pivoted to brackets, which in turn are fastened to cross rods or bars secured to opposite ends of alternate sections of the ladder, as shown; the lower pawls resting on the rounds g of the section G, while the rounds g' of the section G′ rest on the upper pawls, while the pawls themselves, resting on the square corners c^3 c^3 of the brackets C C, and on their pivots e^1, and on the cross-bars A A^1, have three points of support, which construction is in accordance with the highest and best mechanical law for arranging bars to sustain weight. It is almost impossible for said pawls to give way by any ordinary superincumbent weight which may be put upon said ladder.

When the sections of the ladder have been extended until they meet the cornice of a balcony, building, or other obstruction, the levers I I are now attached to one of the upper rounds of the highest-extended section of the ladder.

The attachment is made by opening the latch i, pivoted to said lever at i^1, in both of which are notches i^2 i^2. The notched part of the lever is then placed on one of the said rounds of the ladder and the latch closed, the lever being then securely held in position. By depressing the ends i^3 i^3 of said levers by means of the ropes or chains I′ I′, fastened thereto as shown, the opposite ends of said levers I I, which, if desired, may be provided with friction-wheels i^4, are elevated, and, meeting the wall, as shown in Fig. 2, raise the upper part of the ladder out away from the same to the desired distance, and support it while being still farther extended above said cornice or obstruction. These levers, when not in use, may, if desired, be removed from said rounds of the ladder.

To support the ladder firmly in position when fully or otherwise extended, and keep it from bulging at its center and from swaying to either side, I employ the braces K K. They are composed of the sliding brackets L, having the three sides l l^1 l^2, on the side l^2 in which is the incline or angular slot l^4. The side l^2 is also formed with a projecting lug, l^5, to which is secured a universal joint, L^1, having an opening, l^6, for the reception of a pointed end rod, L^2, which is held in its adjusted position by means of the set-screw l^7.

The brackets L L are made somewhat larger than the sides of the ladder, so that they may have a certain amount of play, in order to adapt themselves to and secure a hold on the sides of the section of the ladder at any angle to which they are attached thereto, as shown in Fig. 1. The slotted angular side of the brackets prevents the braces from being accidentally detached from their position. If desired, for greater security, a catch, M, connected to said bracket by a cord or chain, m, may be used.

What I claim as my invention is—

1. A device for uniting two or more firemen's truck or other ladders to form an ex-

tension-ladder, consisting of one or more cross-bars, upon which are placed two or more sets of brackets, so arranged that one set thereof embraces the sides of the upper ladder-section, while the other set embraces the sides of the lower ladder-section, substantially as shown and described, and for the purpose set forth.

2. A device for uniting two or more firemen's truck or other ladders to form an extension-ladder, consisting of a grooved cross-bar having one or more sets of adjustable brackets, one set of which is provided with spring-pawls, constructed and arranged for operation substantially as shown and described.

3. A device for uniting two or more firemen's truck or other ladders to form an extension-ladder, consisting of a grooved cross-bar, on which are mounted two sets of adjustable sliding brackets, one set of which is adjustably secured to said cross-bar, by set-screws or otherwise, and provided with pivoted spring-pawls, the other being provided with thumb nuts or screws to secure the device to a ladder, substantially as shown and described.

4. A device for uniting two or more firemen's truck or other ladders to form an extension-ladder, consisting of a cross-bar and one or more sets of brackets, to one set of which are attached pivoted spring-pawls, so arranged in relation thereto as to have three supporting-points for sustaining superincumbent weight, substantially as shown and described.

5. In combination with a device for uniting one or more firemen's truck or other ladders to form an extension-ladder, constructed substantially as shown and described, the levers I I, constructed as shown and described, and for the purpose set forth.

6. In combination with a device for uniting two or more firemen's truck or other ladders to form an extension-ladder, constructed substantially as shown and described, the braces K K, as and for the purpose set forth.

7. The combination of the cross-bar A, brackets B B and C C, pawls D D, pivoted to the brackets C C, the pulley *h* and rope H, and ladders G and G′, constructed and arranged for operation substantially as shown and described.

In testimony that I claim the foregoing I have hereunto set my hand this 22d day of September, 1877.

ARTHUR H. MIDDLETON.

Witnesses:

EDWIN F. GLENN,

GEORGE F. GODLEY.