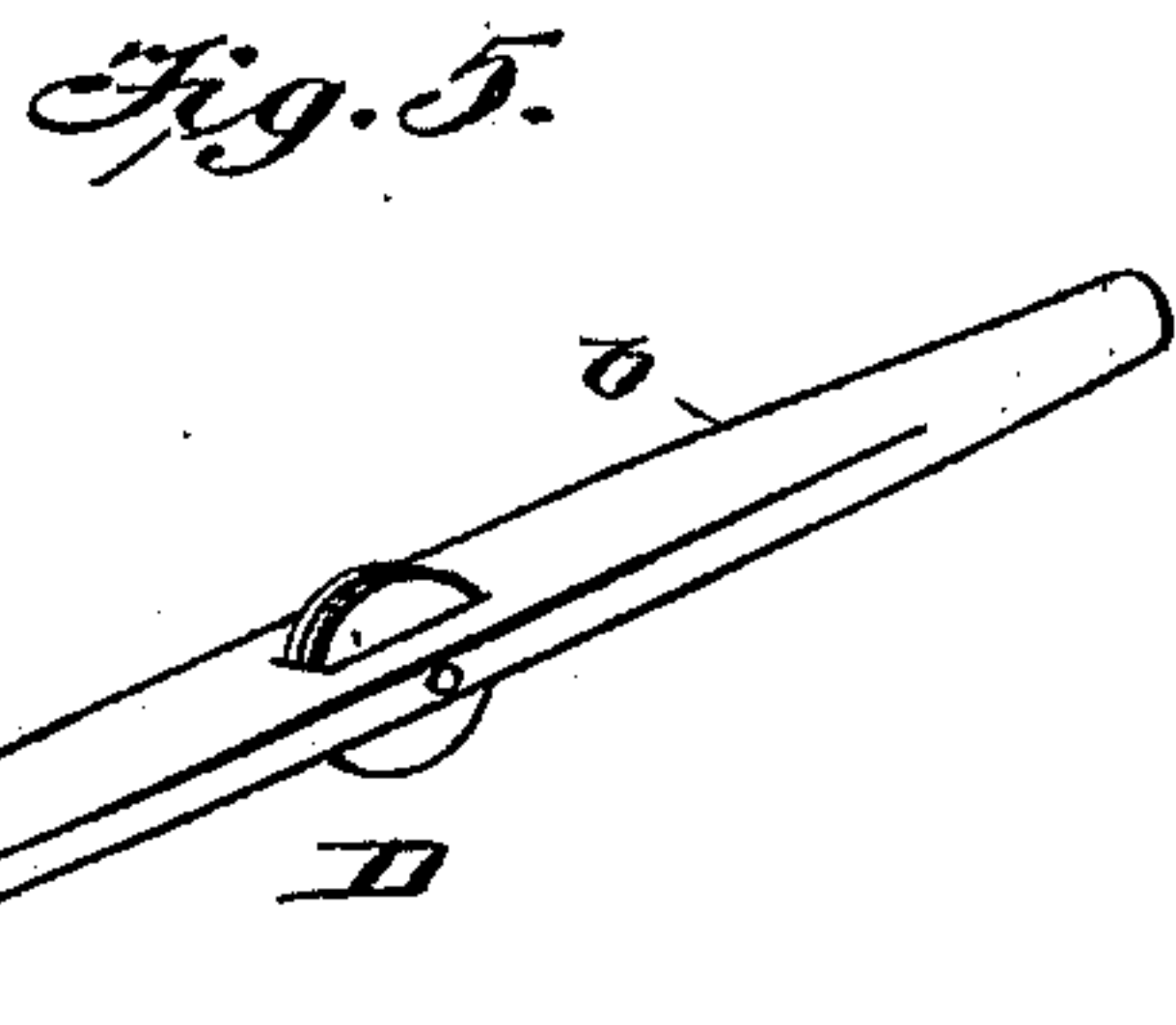
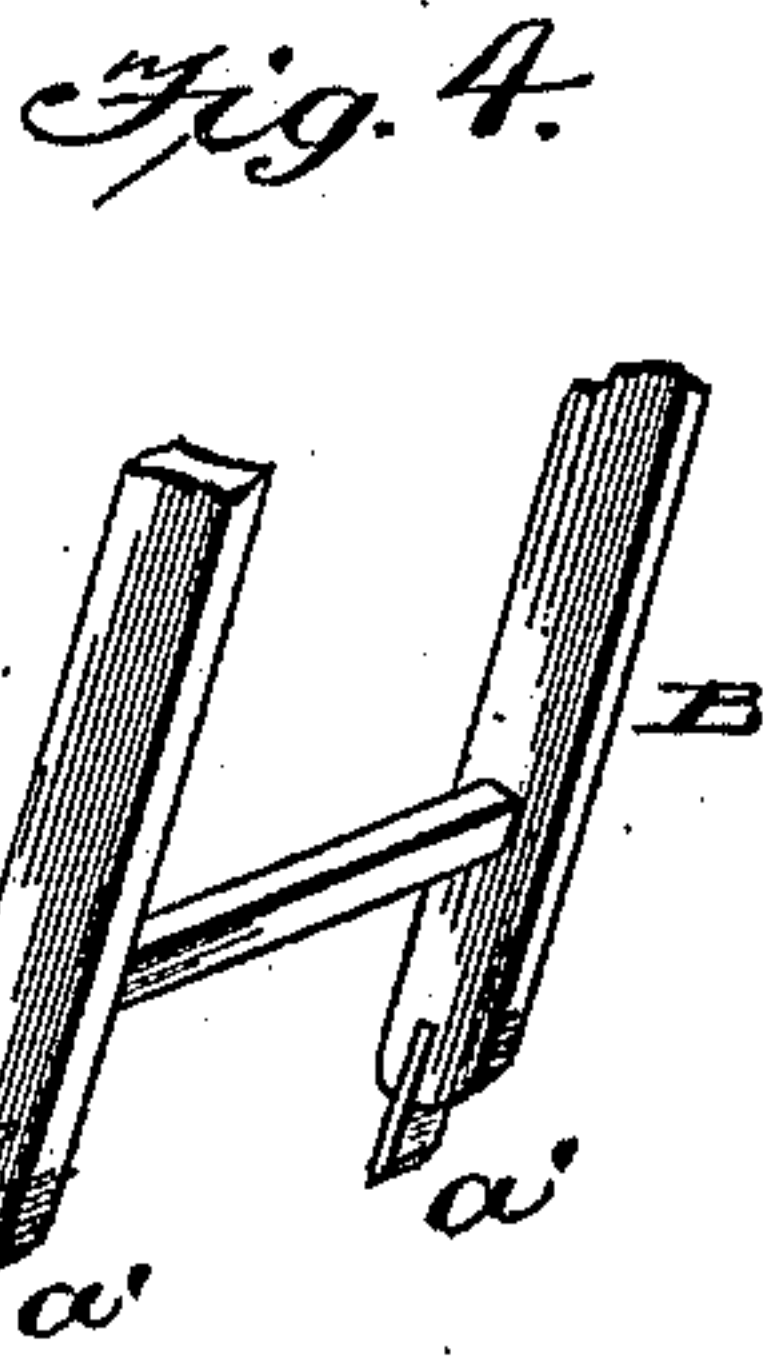
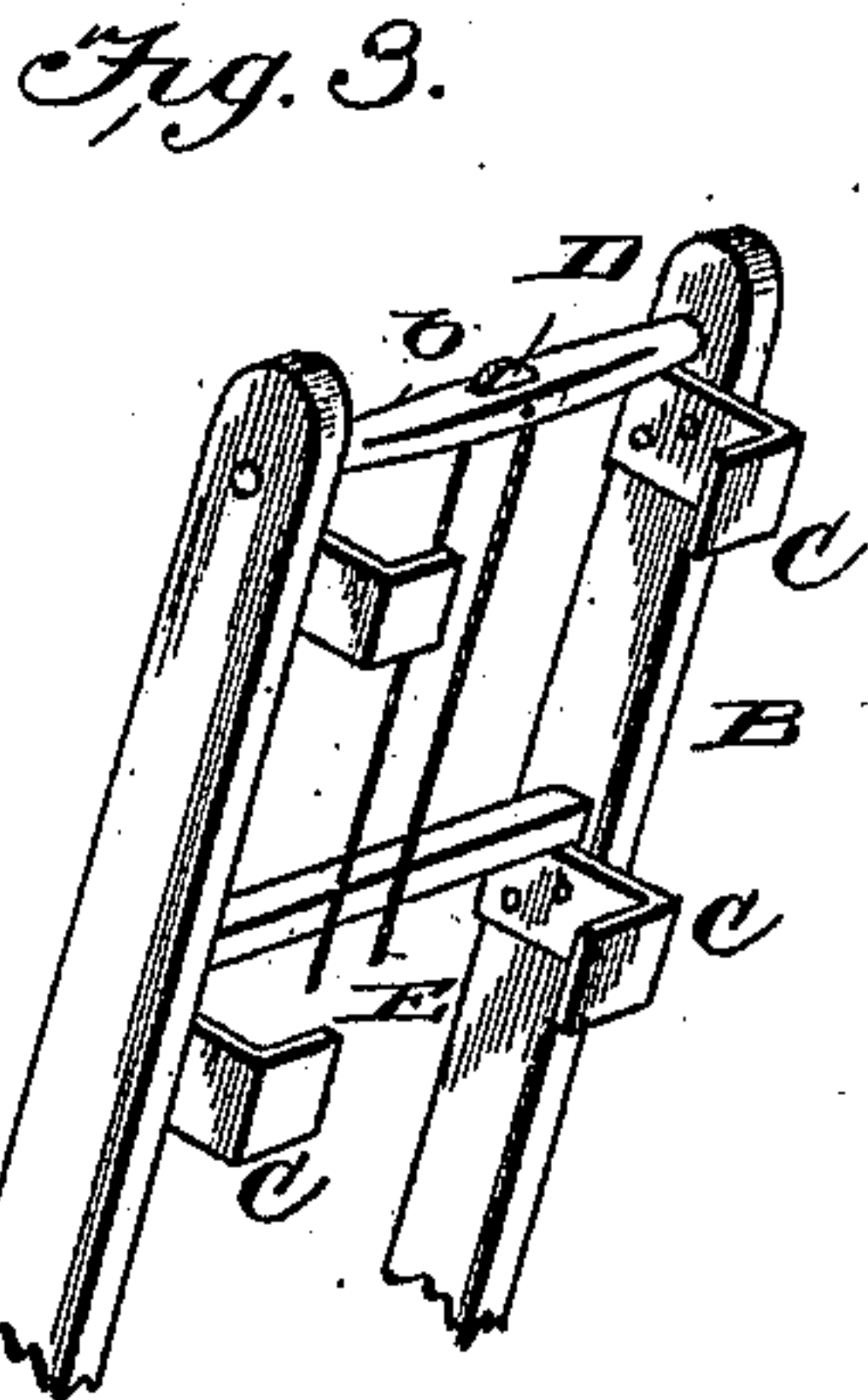
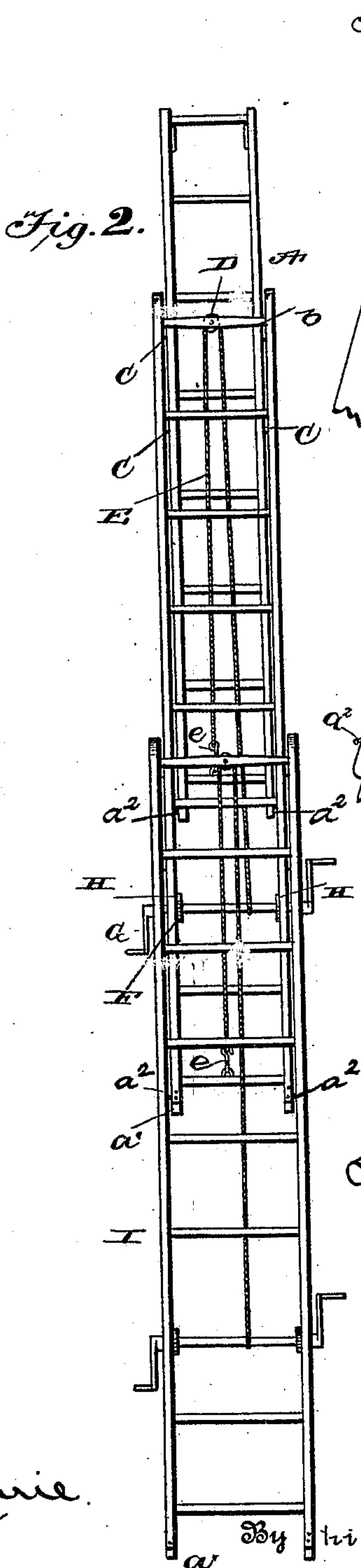
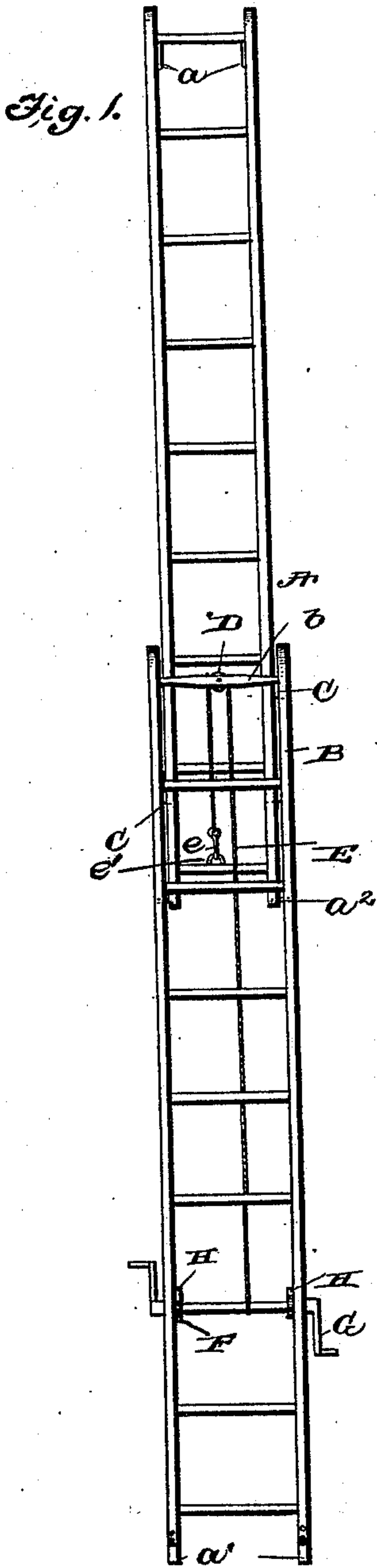


(No Model.)

H. E. SKEELS.
EXTENSION LADDER.

No. 470,515.

Patented Mar. 8, 1892.



Witnesses

John D. Amie.
Wm. A. Deane.

Inventor

Henry E. Skeels

By this Attorney

X. Deane

UNITED STATES PATENT OFFICE.

HENRY ELMER SKEELS, OF WEST CONCORD, MINNESOTA.

EXTENSION-LADDER.

SPECIFICATION forming part of Letters Patent No. 470,515, dated March 8, 1892.

Application filed September 19, 1891. Serial No. 406,244. (No model.)

To all whom it may concern:

Be it known that I, HENRY ELMER SKEELS, a citizen of the United States, residing at West Concord, in the county of Dodge and State of Minnesota, have invented certain new and useful Improvements in Extension-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 appertains to make and use the same.

Figure 1 is an elevation of two single ladders as combined together and extended to form an extension-ladder. Fig. 2 is a view of three ladders combined in like manner. Fig. 3 is a detail in perspective of the second or third or other additional ladder, showing the rung having hoisting-sheave and guide-pieces on side rails. Fig. 4 is a detail in perspective of the lower end of first ladder, showing holding-points; Fig. 5, a perspective view in detail of the rung to which the hoisting-sheave is fixed.

This invention belongs to that class of devices known as "extension-ladders;" and the novelty consists, in general terms, in the construction of the several parts and in their combination as a whole, all as will now be more fully pointed out and explained, reference being had to the accompanying drawings.

In the drawings, A denotes any ordinary ladder. It has at the top of each side rail the usual hooks a , by which it can be attached to the top of a wall or a window-ledge or any projection or holding-surface. At the lower end are the points a' for sticking into the ground or to be otherwise secured to prevent the lower end of the ladder from slipping. If now the ladder has been placed in position and it is desired to add to it a second ladder, the rails of the latter should be just so much wider apart than those of A that when B is put upon A the former can, even when provided with guides C, easily move upon and over A. These guides are bent pieces of metal, each of which is fastened at one end inside the rail of ladder B, and thence extended down and bent at the outer ends. The size of these is such that when applied they will enable the outer ladder to fit snugly upon but to move freely over and upon the narrower under lad-

der. These guides are usually in pairs on each side of the large ladder, one of each pair near the upper end of the rail and the other one of the pair near the second rung from the top.

The method of applying the second ladder to the first is as follows: The first ladder leans against the building. The second B is so placed on the first that its lower guides C shall come just above the upper ends of A, and then B on these guides is allowed to fall till its ends are also on the ground. The top rung b of ladder B is made very strong and sufficiently large to carry in its slotted center the sheave D and sustain it under all ordinary strain or use it can be put to. Over this sheave runs a wire rope E. One end of this rope winds on the windlass-rung F near the lower end of the ladder B. The ends of this rung are journaled in the rails of the ladder. This rung is operated by the crank G, the inner end of which enters through the ladder-rail into the hollow and properly-socketed ends of the rung. The two ladders being one upon the other and the other end of rope E being connected by hook e in an eye e' on the lower rung of ladder A or in any other suitable way, by working the windlass-rung this ladder A will be quickly raised till the stops a^2 in the sides of the lower ends of its rails strike the lower guides C on the upper end of ladder B. By means of the pawl H on the inside of the rail of ladder B and on the side next the crank and the rack F on the end of the windlass-rung with which the pawl engages the rung, when the windlass stops, is held fast. Consequently the rope will hold the smaller ladder in its extended position. It should now be noted that this ladder is thus very firmly and rigidly secured, since the two pairs of guides C will form braces, which under the force of the tight rope stay and rigidly bind the ends of the two ladders, so that they have in this union almost the firmness of a homogeneous piece or a single ladder. If now it is desired to add a third section or ladder I to the combination, it is placed upon the ladder or section B like as B was put upon ladder A, and, being furnished like B with sheaves, windlass, and hoisting-rope, by the same detail of operation it is ready when the lower

end of the rope is secured to the lower rung of ladder B for raising simultaneously both the extended ladders A and B. When thus fully raised, the combined sections are held
 5 firmly by means of the guides and the rope and pawl and ratchet, as has already been explained when section or ladder A was hoisted. When the combined ladder is to be lowered, it is done by a reverse of operation, which is
 10 obvious and need not be described. By this structure and combination of parts is obtained a very simple, cheap, efficient, and most durable device. There is no complex machinery to get out of order or that is diffi-
 15 cult of manipulation, nor can the parts interfere with each other either in raising or lowering. As has been explained, the structure is such that in the movements up or down the under ladder cannot interfere with the
 20 part which is above it or the mechanism which raises or lowers. In the lower end of the rails of each section or ladder are points for sticking into the ground or holding, as are indicated at *a'* of section B.

25 What I claim is—

1. In an extension-ladder, the combination of an ordinary section of ladder A with the wider ladder or section B, having at or near its upper end, on each side, a pair of guides
 30 adapted to receive the side rails of the under narrow ladder-section and provided with hoisting mechanism, as described, whereby this section can be placed upon the first section, the hoisting mechanism connected with
 35 the latter, and the first section raised or hoisted, as set forth.

2. The extension-ladder comprising the series of ladder-sections varying successively in width, one section having pairs of downwardly and inwardly extended guides adapted
 40 to receive the side rails of the lower section, one pair of guides being arranged near the upper end of its ladder-section and the other or lower pair of guides being arranged about at the second rung from said end of said lad-
 45 der-section, and the under or narrower ladder-section having stops adapted to engage said lower guides at the maximum extension of said section, and means for the respective extension of said series of ladder-sections, substantially as set forth.

3. The extension-ladder comprising the series of ladder-sections varying successively in width, the intermediate section having pairs of downwardly and inwardly extended guides,
 55 one pair being arranged near the upper end thereof and the other or lower pair of guides being arranged about at the second rung from said end of said ladder-section, and the under ladder-section having inwardly-projecting stops adapted to engage said lower
 60 guides at the maximum extension of said bottom section, and the respective ropes and windlasses for the bottom and intermediate ladder sections, adapted to successively elevate said ladder-sections.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY ELMER SKEELS.

Witnesses:

G. W. CARR,
 ALFRED COLLINS.