

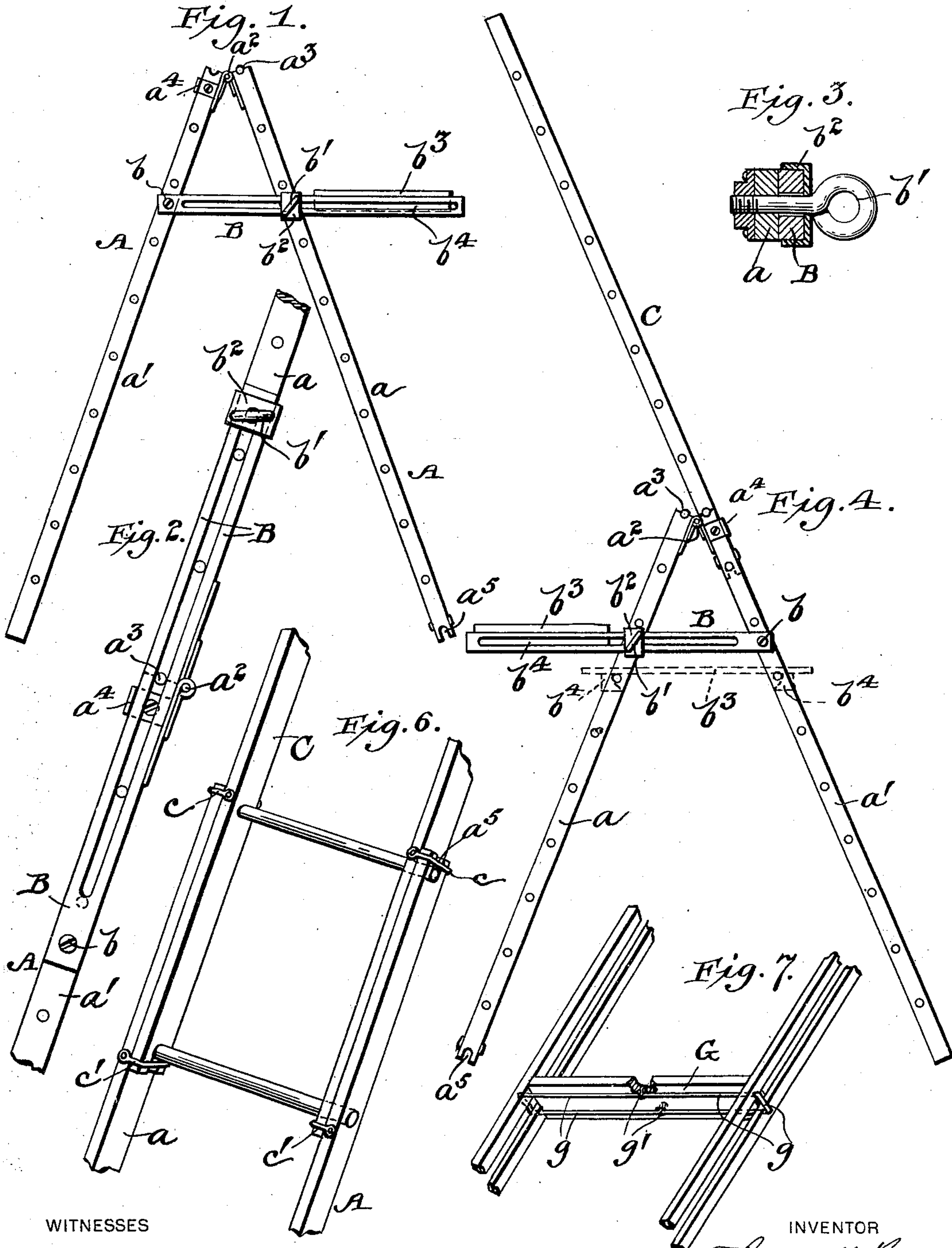
(No Model.)

2 Sheets—Sheet 1.

T. W. HUGHES.  
LADDER.

No. 591,351.

Patented Oct. 5, 1897.



WITNESSES

George A. Lawrence.  
R. H. Fenwick.

INVENTOR

Thomas W. Hughes  
By his Attys  
R. H. Fenwick & George A. Lawrence.

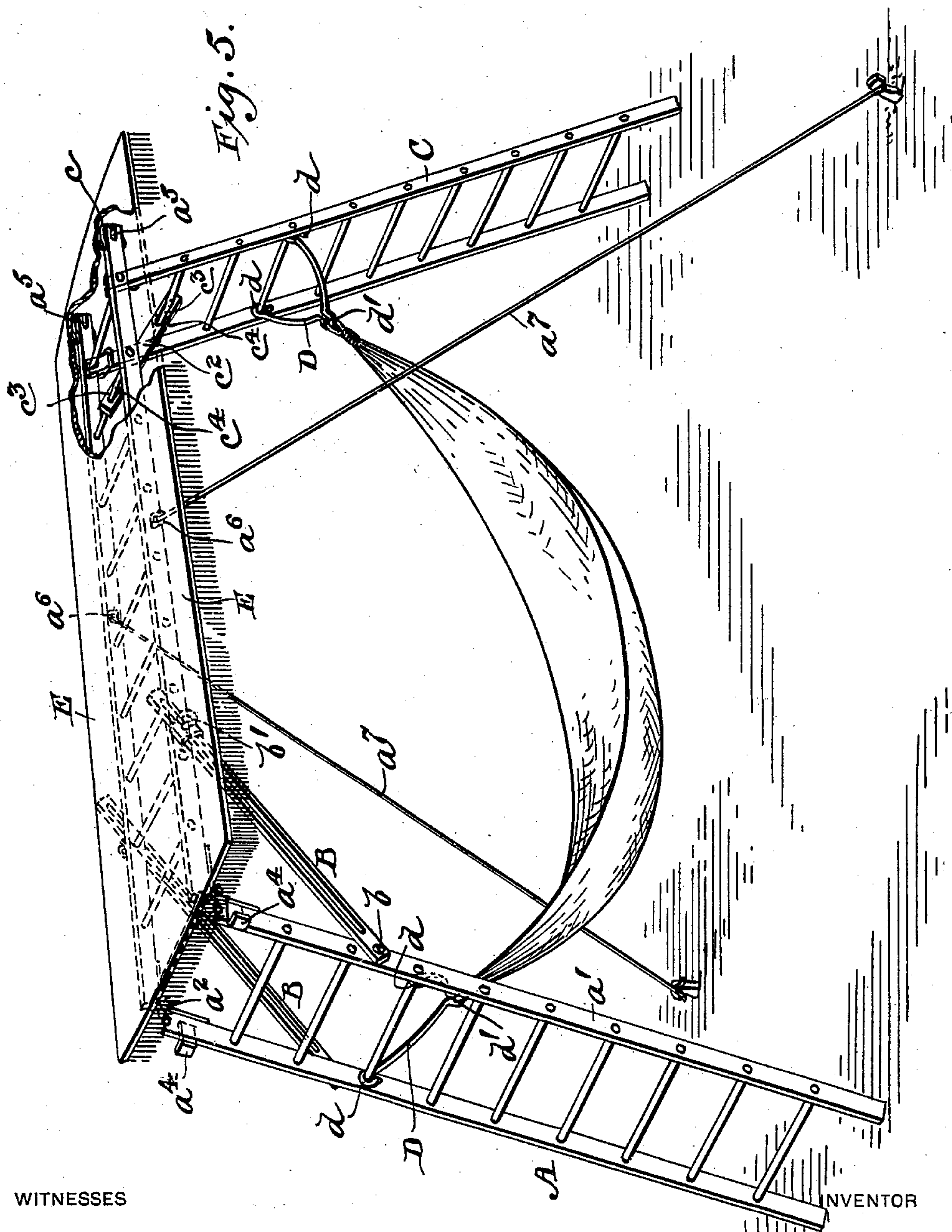
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WITNESSES

*Severance*  
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*Thomas W. Hughes*  
*by his Attys*  
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# UNITED STATES PATENT OFFICE.

THOMAS W. HUGHES, OF HARRISONBURG, VIRGINIA, ASSIGNOR OF THREE-FOURTHS TO OLIVER B. ROLLER, EDWARD C. MARTZ, AND EDWARD PURCELL, JR., OF SAME PLACE.

## LADDER.

SPECIFICATION forming part of Letters Patent No. 591,351, dated October 5, 1897.

Application filed February 26, 1897. Serial No. 625,141. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS W. HUGHES, a citizen of the United States, residing at Harrisonburg, in the county of Rockingham and State of Virginia, have invented certain new and useful Improvements in 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.

My invention relates to ladders; and it consists in certain novel constructions, combinations, and arrangements of parts, as will be hereinafter fully described and claimed.

In the accompanying drawings, Figure 1 represents a side elevation of my improved ladder in one of its adjusted positions. Fig. 2 shows a side elevation of a portion of said ladder, the joint being shown in its straightened-out position. Fig. 3 is a detail cross-section through one of the clamps of said jointed portion. Fig. 4 shows a side elevation similar to Fig. 1, but with the extension secured in place. Fig. 5 represents a perspective view of my improved ladder used as a support for a hammock and a canopy. Fig. 6 is a detail perspective view showing the means of attaching the extension upon the end of the ladder when the same is in its extended position, and Fig. 7 represents the manner of supporting flat steps instead of rungs.

A in the drawings represents the main portion of my ladder. B represents side braces, and C an extension portion.

The main portion of my ladder is preferably constructed of two ladder-sections  $a a'$ , hinged together at their ends, as indicated at  $a^2$ . These sections  $a a'$  are preferably made of equal length. I preferably joint this ladder at one of the rungs, as at  $a^3$ , for the purpose of making the spaces between all the rungs or steps the same distance apart, so that any one ascending the ladder from either side will find the steps all spaced alike. I also secure a further advantage by this construction, as will be hereinafter fully described.

When the ladder is to be used as a self-sup-

porting step-ladder, the portions  $a a'$  are bent at an angle to each other on their hinges and are adapted to be held at said angle by the said braces B. These braces B are constructed, preferably, of slotted pieces, as illustrated, pivoted at one end to one of the sections, as at  $b$ , the slotted portion of the side braces being adapted to engage and slide upon clamping-bolts  $b'$  upon the opposite member of the ladder.

The clamping-bolts  $b'$  may be of any desired construction, but I prefer to form them, as shown in the drawings, of a rod of iron or other suitable metal screw-threaded at their inner ends to engage screw-threaded nuts or pieces secured to the inner sides of the side bars of the ladder-sections, the outer ends of said bolts being bent to form loops, whereby they form handles by which said bolts may be rotated. Interposed between the said loops and the braces are angular clips  $b^2$ , the bent-up end portions of which inclose the braces and form a bearing portion for the heads of the screw-bolts  $b' b'$  to bear against. These clips  $b^2$  are by their construction adapted to strengthen the slotted portion of the side braces B and prevent them spreading under strain.

It will be noticed that when my ladder is adjusted to the position similar to that shown in Fig. 1 the braces extend out beyond the ladder-section, so as to form supports for a board or any suitable platform  $b^3$ , which may be laid across the said projecting end portions. This board  $b^3$  is preferably provided with cleats  $b^4$  upon its under surface to hold it in place between the said brace-rods. These cleats  $b^4$  are also provided with concaved inner surfaces, which are adapted to hook over the rungs of the two sections of the ladder when the same is placed across between said sections to form a support, as illustrated by dotted lines in Fig. 4 of the drawings. It will be noted that these concaved surfaces form hooked portions to extend partially beneath the rungs of the ladder-sections, so that any one standing upon one end of the platform will not tilt the same, the said cleats preventing such an occurrence.



When it is desired to use the ladder without its being self-supporting, and especially when it is desired to use a higher ladder, the sections may be quickly straightened out and clamped, as shown in Fig. 2 of the drawings, to form one continuous ladder, it being only necessary to loosen the clamping-bolts  $b^1$ , straighten the sections upon their hinges  $a^2$ , the slots in the braces permitting of this movement, and clamping the parts in this position again by tightening the said clamping-bolts  $b^2$ .

In order to strengthen the joints at the hinges and to prevent undue strain upon the same, side lugs  $a^4$ , forming stops, are preferably secured to the opposite sides of one of the ladder-sections. These lugs  $a^4$  are formed of angle-plates secured by screws or other suitable means to the said ladder-section, the bent portion overhanging the brace-rods and limiting the movement of the same when the ladder is in its straightened position.

I contemplate using flat steps  $G$  instead of rungs, when desired, and when I use these steps I support them between the sides of the ladder, as shown in Fig. 7 of the drawings. Two loops of wire  $g$ , preferably U-shaped, are passed through the sides of the ladder and extend toward each other. The opposite ends of the loops meet beneath the steps  $G$  and are twisted together until the proper tension is obtained, and each of said twisted ends is then turned up and driven into holes  $g' g'$ , provided on the under side of the steps for the reception of said wires. By this construction the sides of the ladder are bound firmly against the ends of the steps, and the said steps are not only supported in this way, but if there is any tendency to sag the strain will be received by the wire loops. The side bars of the ladder in this construction may be formed of two parallel braces slightly separated, as illustrated in the drawings. This is a simple but strong construction for steps for ladders.

When it is desired to have a longer ladder than will be formed by the straightening out of the sections  $a a'$ , I provide an additional section  $C$ , adapted to be secured in place upon the upper end of the ladder  $A$ . To facilitate this connection, I provide the upper end of said ladder with bifurcated portions, as  $a^5$ , which are adapted to receive the extended ends of the lowermost rung of the extension portion  $C$ . The lower end of the extension portion  $C$  is also provided with bifurcated portions adapted to fit over the upper rung of the ladder  $A$ . In order to bind these sections securely in position, I further provide pivoted bails  $c c$  and  $c' c'$ . The bails  $c c$  are pivoted to the ladder-section  $C$  opposite the lowermost rung of said section, and the bails  $c' c'$  are pivoted to the upper end of the ladder  $A$  near its uppermost rung. When the upper section is put in place, the bifurcated portions engaging the rungs as above described, the bails  $c' c'$  are swung in-

ward from the ends of the ladder-section  $C$  and the bails  $c c$  are swung outward, so as to embrace and inclose the upper ends of the ladder  $A$ . These bails bind the parts firmly together, and their action is such that they prevent the sections being pulled apart. The sections can be easily separated again by swinging the bails back upon their pivotal joints.

When it is desired to use a self-supporting ladder and yet one higher than would be formed by the mere setting up of the ladder-sections, as shown in Fig. 1, my construction of ladder is particularly well adapted for applying the extension-section  $C$  to said ladder  $A$  when it is in position shown in said Fig. 1.

The peculiar construction of dividing the ladder at one of the rungs heretofore described facilitates the ready adjustment of the extension-section in place at the upper end of the ladder-section  $a'$ . The extended ends of the lowermost rung of said ladder-extension  $C$  rest in semicircular grooves at the upper end of the said section  $a'$ . At the same time the lower bifurcated ends of said extension-section  $C$  embrace and rest upon the upper rung of the lower section  $a$ . By this means an extension-ladder is formed which is self-supporting and which will be perfectly secure no matter at what angle the lower section of the ladder  $A$  may be placed with relation to each other.

It will be observed that the grooves in the upper end of the section  $a'$  are normally adapted to fit around the upper rung of the opposite ladder  $a$  when the two sections are straightened out to form one ladder, and that these grooves also serve to hold the said extension-ladder firmly in place when used as just described.

I have found that my ladder, in addition to the uses for which it has been already described, is particularly well adapted for supporting a hammock or similar suspended rest. When using it for this purpose, the sections  $a a'$  are spread a sufficient distance apart, as illustrated in Fig. 5 of the drawings, and clamped in that position. The end of the section  $a$  farthest from the hinge  $a^2$  is then raised and supported in position at the proper height by placing the extension-section  $C$  beneath the same in an inverted position, the bifurcated ends thereof engaging a rung of the section  $a'$  and thus supporting the said section at the proper height.

It will be noticed that the sections  $a a'$  are properly braced in position by the braces  $B B$ , heretofore described. In order to brace the extension-section  $C$  in the desired position, I use a brace-piece  $c^2$ , which may be made of wood or metal, or any other suitable material, and is provided in its ends with slots  $c^3 c^3$ , which slots are open at the sides, as at  $c^4$ , opposite their inner ends. In applying these braces in position it is merely necessary to insert the rungs, one on each ladder-section, into the openings  $c^4 c^4$  and then spread the



ladder-sections so as to draw the rungs into the closed ends of the slots  $c^3 c^3$ . I preferably insert in the sides of the upper cross-section  $a$  loops or eyes  $a^6$  in the outer surface of the side bars of the said section. By means of these eyes  $a^6 a^6$  I am enabled to further brace the support thus formed for the hammock by securing the guy-ropes  $a^7 a^7$  thereon. The said guy-ropes may be secured at their opposite ends to a convenient tree, post, or pins driven in the ground.

To secure a hammock in place between the ladder-sections, I provide a hook, as D, preferably formed of a single piece of metal or wire bent, as shown, so as to have hooking ends  $d d$ , adapted to engage the rungs of the ladders. The hooks D are also provided with eyes  $d' d'$ , to which the hammock or other suitable swing or support may be secured, as shown. It will be apparent that my ladder is thus adapted to be used as a strong and desirable support for the hammock, and one that can be quickly set up or taken down at will. The hooks D also permit of a quick adjustment of the hammock to different heights by placing said hooks upon different rungs of the ladder. Also the head or feet may be raised or lowered irrespective of each other to give the desired inclination to the hammock. When used in this way, a suitable canopy or covering E may be placed over the top of the frame thus formed by the ladder to protect the occupants of the hammock. The ladder when adjusted to this position may also be used for a scaffolding or similar support by placing boards across the top section.

From the foregoing description it will appear that I am enabled by my construction and arrangement of parts to produce a ladder of simple form and easy manipulation, and yet one that is very strong in every respect. It is also capable of being quickly changed from one use described to another and is well adapted for every purpose described.

Having now described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A ladder comprising sections hinged together, and braces pivotally secured to the side of one of the said sections and provided with longitudinal slots, clamping-bolts secured to the other section and working in said slots and angle-clips interposed between the heads of the clamping-bolts and the said braces for supporting bearing-surfaces for the said bolt-heads and preventing the spreading of the slotted portions of the said braces, substantially as described.

2. A ladder comprising sections hinged together at their ends, braces pivotally secured to the sides of one of said sections, provided with longitudinal slots, clamping-bolts working in said slots for clamping the braces to the sides of the opposite section whereby the sections may be secured at different angles to each other, the said slots being of sufficient length to permit of the ladders being straight-

ened out to form one continuous ladder, angle bearing-plates interposed between the heads of the clamping-bolts and in the outer surfaces of the braces for preventing the spreading of the slotted portions thereof, and limiting-lugs secured to the outer surface of one of said ladder-sections whereby the movement of the braces is limited and the ladder is adapted to be strengthened when in its extended position, substantially as described.

3. In a ladder, the combination with side bars, of steps between the same, wire loops passing through the said side bars beneath the steps, one end of each loop passing along under each edge of the step and extending toward the center of the ladder and meeting the ends of the opposite loop, the said loops having their opposite ends twisted together to exert a tension upon the parts, the construction being such that the steps are supported along both edges by the wires upon which they directly rest, so that they cannot tip in either direction, substantially as described.

4. In a ladder, the combination with side bars, of steps interposed between the same, U-shaped pieces of wire extending through the said side bars and beneath the steps to support them, both ends of each loop or piece extending toward the center of the ladder along each edge of the steps and meeting the opposite loop, and having their opposite ends twisted together and their twisted ends turned up, the said steps resting directly upon the loops and being provided with apertures in their under sides to receive the bent-up ends, the construction being such that the steps are supported along both edges so as not to tip in either direction, substantially as described.

5. A ladder comprising two sections of equal length hinged together at their ends, side braces consisting of straight bars pivotally secured to the outer sides of one of said sections and provided with longitudinal slots, clamping-bolts secured to the other section and adapted to engage said slots, bearing-plates interposed between said plates and the braces and adapted to inclose said braces to prevent the slotted portion thereof from spreading, the construction being such that upon the sections being arranged at any suitable angle with relation to each other, the outer ends of said braces will extend beyond one of said sections and assume a horizontal position to form a support to one side of the ladder for the platform or other suitable device, substantially as described.

6. In a ladder, the combination of sections of equal length hinged together at their ends, said hinges being opposite a rung of the ladder, braces consisting of straight bars pivotally secured to one of said ladders on the outer sides thereof, and provided with longitudinal slots, clamping-bolts adapted to engage said slots for securing the braces to the ladder whereby the ladder-sections may be set at an angle to each other to form a self-sup-



porting ladder, an extension-section provided with bifurcated lower ends, a rung of said section having its ends extending beyond the surfaces of the side bars thereof and adapted  
5 to engage the half-recesses of the rung opposite the hinges in the upper ends of said lower section, the construction being such that the ladder-sections are adapted to form a self-

supporting extension-ladder, substantially as described. 10

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

THOMAS W. HUGHES.

Witnesses:

CHAS. A. HAMMER,

L. J. GOLDER.