May 5, 1959 F. F. NELSON 2,885,133

SELF-ADJUSTING ORCHARD LADDER

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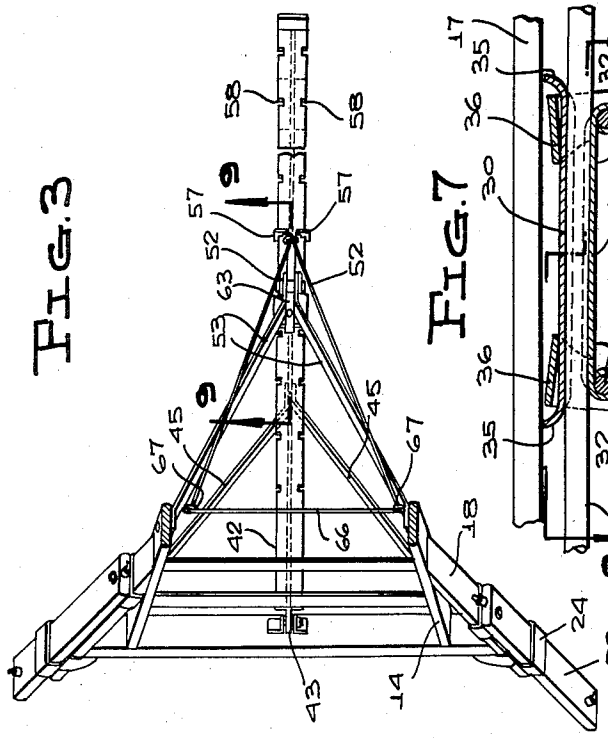


FIG. 3

FIG. 7

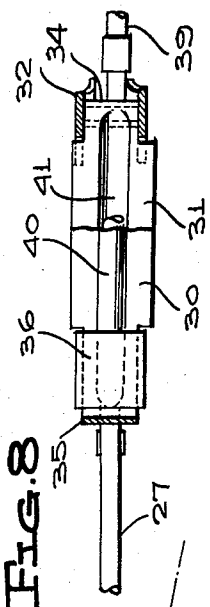


FIG. 8

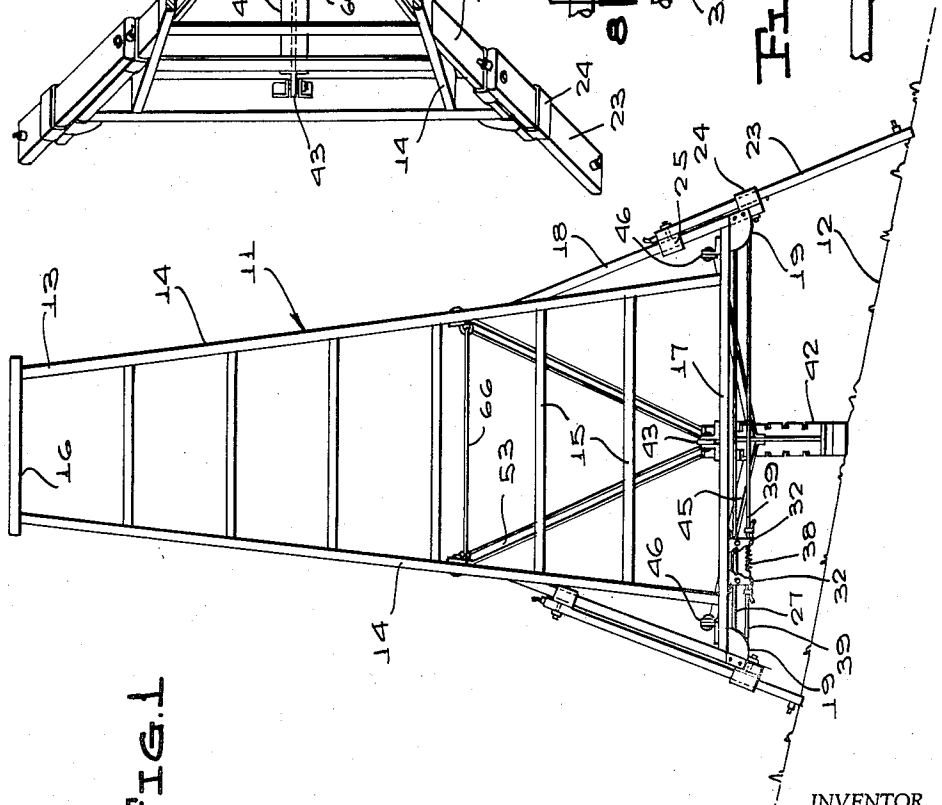


FIG. 1

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FIG. 2

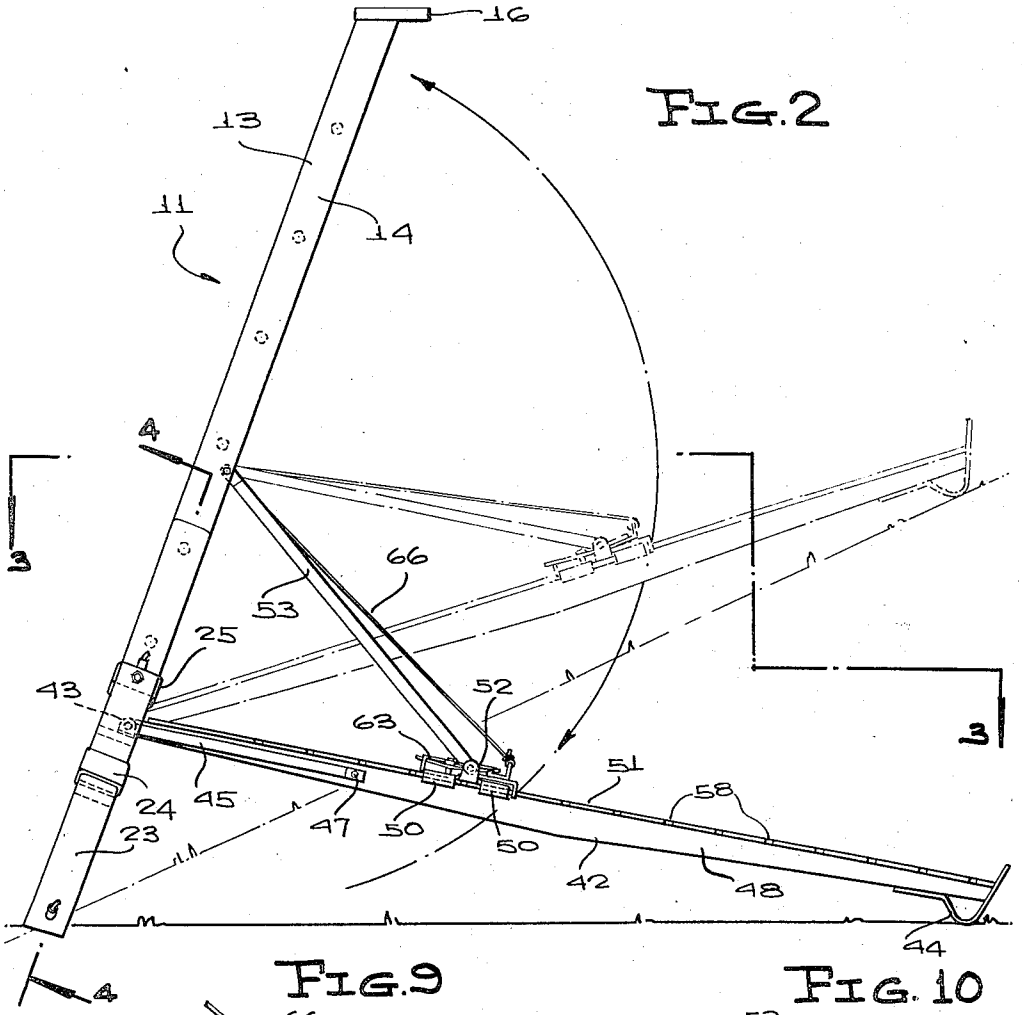


FIG. 9

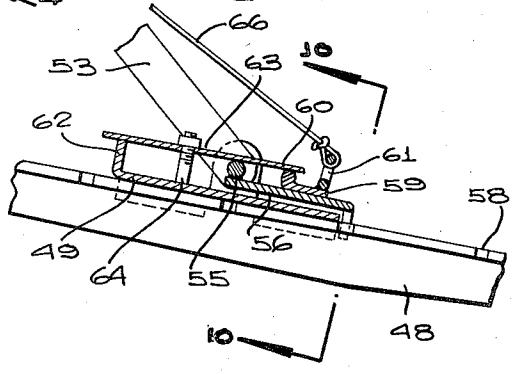
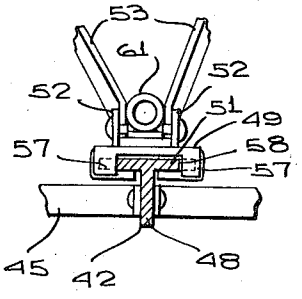


FIG. 10



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FIG. 4

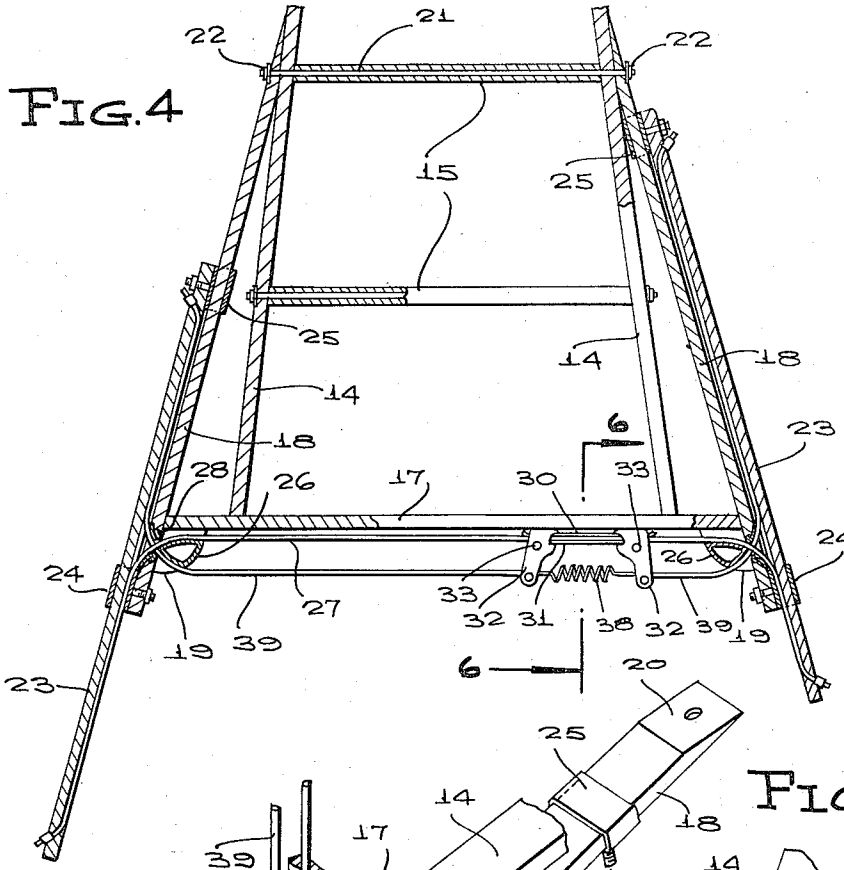


FIG. 6

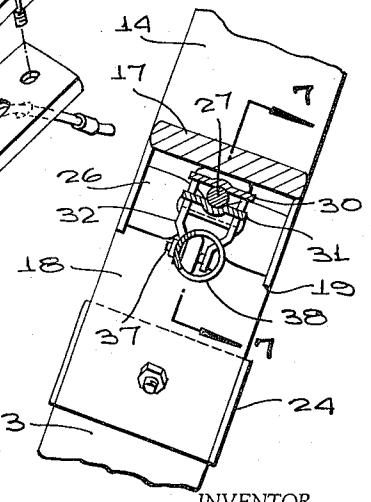
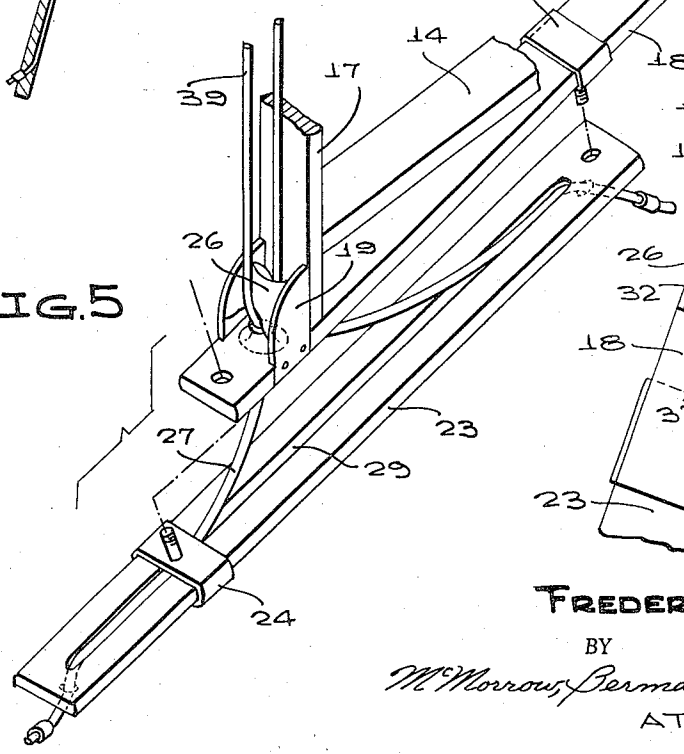


FIG. 5



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SELF-ADJUSTING ORCHARD LADDER

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Application February 21, 1958, Serial No. 716,735

7 Claims. (Cl. 228—63)

This invention relates to ladders, and more particularly to an orchard ladder provided with means for adjusting the supporting legs thereof automatically to irregularities of the supporting terrain.

A main object of the invention is to provide a novel and improved ladder especially useful for harvesting fruit and similar activities, the ladder being simple in construction, being easy to set up for use, and being provided with means for automatically adjusting the ladder to irregularities in the supporting terrain, whereby the ladder will be safely held in an upright position when used on a slope or on ground which is irregular or rough.

A further object of the invention is to provide an improved orchard ladder which is inexpensive to manufacture, which is durable in construction, which may be rapidly and easily set up for use, and which is self-adjusting so that it will safely support the person using same regardless of irregularity of the ground on which it is placed.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

Figure 1 is a front elevational view of an improved orchard ladder according to the present invention, shown supported on a slope.

Figure 2 is a side elevational view of the ladder of Figure 1.

Figure 3 is a horizontal cross-sectional view taken on the line 3—3 of Figure 2.

Figure 4 is an enlarged cross-sectional view taken substantially on the line 4—4 of Figure 2.

Figure 5 is an enlarged perspective view showing a lower side portion of the ladder of Figure 4 with the elements thereof in various positions.

Figure 6 is an enlarged cross-sectional detail view taken on the line 6—6 of Figure 4.

Figure 7 is a cross-sectional view taken on the line 7—7 of Figure 6.

Figure 8 is a cross-sectional view taken on the line 8—8 of Figure 7.

Figure 9 is an enlarged cross-sectional detail view taken on the line 9—9 of Figure 3.

Figure 10 is a cross-sectional view taken on the line 10—10 of Figure 9.

Referring to the drawings, 11 generally designates an orchard ladder according to the present invention, shown set up for use on a slope 12. The ladder 11 comprises a supporting frame 13 having the upwardly converging side members 14, 14 which are connected by the rungs 15 and which are rigidly connected at their top ends by the platform member 16. The bottom ends of the side bars 14, 14 are rigidly connected by a cross bar 17 and project outwardly beyond the bottom ends of the side bars 14, 14.

Designated respectively at 18, 18 are inclined brace bars which are rigidly connected at their lower portions

to their respective opposite ends of the cross bar 17, as by the respective bottom corner angle brackets 19, 19. The top ends of the brace bars 18, 18 are tapered, as shown at 20, and are rigidly secured to the outside surfaces of the side bars 14, 14 in any suitable manner, for example, by the tie rod 21 of one of the rungs 15, the ends of said tie rod extending through apertures in the tapered end portions of the brace bars 18, 18 and clamping said end portions to the side bars 14, 14 by the fastening nuts 22 provided on the respective opposite ends of the tie rod 21.

As shown in Figure 4, the lower end portions of the brace bars 18, 18 project below the cross bar 17.

Designated respectively at 23, 23 are supporting leg members which are slidably connected to the brace bars 18, 18 at the outer sides thereof, for example, by respective pairs of guide sleeve members 24, 24 and 25, 25. The guide sleeve members 24 are secured to the lower ends of the brace bars 18, 18 and slidably receive the legs 23, whereas the guide sleeves 25 are secured to the top ends of the legs 23 and slidably received the brace bars 18. This is clearly shown in Figure 4.

The brackets 19 are formed with the transversely extending, hollow guide block elements 26 which are spaced from the corners defined between the cross bar 17 and the brace bars 18, 18 to define guide passageways, as shown in Figure 4. Designated at 27 is a first cable member whose ends are fastened to the lower end portions of the slidable leg members 23, 23 and which passes upwardly through the guide sleeves 24, through guide openings 28 in the lower portions of the brace bars 18, 18 and through the guide passageways defined above the guide block members 26, 26. As shown in Figure 5, the slidable leg members 23 are formed on their inside surfaces with vertical guide grooves 29 in which the side portions of the cable 27 are received.

The intermediate portion of cable 27 passes between generally horizontal upper and lower clamping plates 30 and 31, as shown in Figure 7, and extending over the end portions of the clamping plates are respective yoke members 32, 32, said yoke members being pivotally connected at their intermediate portions to the respective ends of the lower clamping plate 31 by transverse hinge pins 33, 33 connecting the intermediate portions of the side arms of the yoke members and passing through respective transverse hinge sleeves 34, 34 formed on the ends of the lower clamping plate 31. The upper clamping plate 30 is turned upwardly at its respective ends, as shown at 35, 35, the bight portions 36, 36 of the respective yoke members 32, 32 being received inwardly adjacent respective upturned end flanges 35, 35 on the upper clamping plate 30.

As will be readily apparent from Figure 7, the bight portions 36, 36 of the yoke members 32, 32 are of substantial width, whereby said bight portions exert a downward clamping force on the upper clamping plate 30 when the lower portions of the bight members 32, 32 are rotated outwardly.

The lower ends of the respective yoke members 32, 32 are connected by transverse pins 37, 37, and a coil spring 38 is connected between the pins 37, 37, biasing the lower portions of the yoke members 32, 32 towards each other, whereby to normally relieve the clamping force on the upper clamping plate 30.

Designated respectively at 39, 39 are additional cable members connected respectively to the top portions of the slidable leg members 23, 23 and extending downwardly through the grooves 29 and passages 28 around the lower end surfaces of the transverse guide blocks 26. The inner ends of the cables 39 are connected respectively to the transverse pin member 37 of the yoke members 32, whereby a load placed on the supporting frame 13

is transmitted to the cable members 39, 39 through the brace bars 18, 18, developing tension in the cable members 39, 39 and thus tending to rotate the lower portions of the yoke members 32, 32 outwardly, whereby to cause the bight portions 36, 36 of said yoke members to exert downward clamping force on the upper clamping plate 30.

The clamping plates 30, 31 are formed with respective opposing longitudinal channels 40, 41 in which the intermediate portion of cable 27 is received, and is clamped when the above described clamping force is applied to the upper clamping plate 30. Designated at 42 is a rearwardly extending supporting leg which is hingedly connected at 43 to the intermediate portion of the cross bar 17, said supporting leg being provided at its outer end with a ground-engaging skid bar 44, as is clearly shown in Figure 2. The supporting leg 42 is constrained to rotate around the transverse axis of the hinge connection 43 by respective inclined guide struts 45, 45 connecting the intermediate portions of the leg 42 to respective pivot brackets 46, 46 secured on the opposite end portions of the cross bar 17.

The rearwardly extending leg 42 is preferably T-shaped in cross section and the end portions of the link bars 45, 45 are pivotally connected to opposite sides of the depending flange 48 of leg 42 by a common transverse hinge rivet 47.

Slidably mounted on the head portion of the T-shaped leg 42 is a shoe member 49, said shoe member being provided with opposing pairs of channeled side flanges 50, 50 which slidably engage around the respective opposite edges of the head portion 51 of leg member 42. The intermediate portion of the shoe member 49 is formed with respective upstanding lugs 52, 52 projecting upwardly from the opposite side margins of shoe member 49 between the respective channeled flange members 50, 50 at said side portions, and each lug 52 is connected by a link bar 53 to a respective side bar 14 of the supporting frame 13. The link bars 53 are connected to the side bars 14 at the same height, whereby said link bars 53 define a linkage connection with the shoe member 49, allowing said shoe member to be adjusted along the head 51 of the T-shaped leg member 42, and at times allowing said leg member 42 to be folded upwardly to a position closely adjacent to the plane of the supporting frame 13. Thus, the leg 42 may be at times folded to a position closely adjacent to the frame 13, whereby the bulk of the ladder device is reduced to a minimum, facilitating the transportation and storage of said ladder device.

A common transverse pivot pin 55 extends through the lugs 52, 52 and through the outer ends of the link bar 53. Rigidly connected to the intermediate portion of the pin 55, between the upstanding lugs 52, 52, is a longitudinally extending dog member 56 which overlies the rear portion of the shoe member 49, as shown in Figure 9, and which is provided at its outer ends with the depending locking fingers 57, 57 which are engageable in opposing pairs of notches 58, 58 formed in the head member 51 of leg 42 at spaced locations therealong, whereby to lock the shoe member 49 adjacent said locations.

Secured to the top surface of the dog 56 at its intermediate portion is a bracket member 59 formed at one end with an upstanding abutment 60 and having a fastening ring 61 secured to its opposite end. The shoe member 49 is formed at its forward end with an upstanding transverse flange 62, and a leaf spring 63 is secured at its intermediate portion to an upstanding stud member 64 provided on the shoe member 49, as shown in Figure 9, whereby the leaf spring is held in engagement with the flange 62 and abutment member 60, exerting a downward biasing force on the locking dog 56.

A release cable 66 extends through respective eye members 67, 67 secured to the upper end portions of the link rods 53, 53 and has its end fastened to the upwardly projecting eye member 61, whereby a pull on the transversely extending portion of the release cable 66 elevates the locking dog 56 against the biasing force of the leaf spring 63, causing the lugs 57, 57 to disengage from the notches 58, 58, and allowing the shoe member 49 to be moved along the leg 42. This allows the leg 42 to be adjusted to a desired position relative to the supporting frame 13, for example, to the supporting position thereof shown in Figure 2, cooperating with the adjustable leg members 23, 23 to support the frame 13 in an upstanding operative position.

As will be readily apparent, when the device is set up on sloping ground, for example, on the slope 12, the legs 23, 23 automatically adjust themselves relative to their associated brace bars 18, 18, so that the frame 13 will be arranged in its correct upstanding position. Similarly, the rearwardly extending leg member 42 is adjusted to the desired position thereof to support the frame 13 in its correct upstanding position. When the user mounts the supporting frame 13, the weight thus placed on the frame develops tension in the cable members 39, 39, causing the lower portions of the yoke members 32, 32, to be rotated outwardly, as above described, thus causing the bight portions 36, 36 of said yoke members to exert downward clamping force on the upper clamping plate 30, which locks the cable 27 and thus secures the slidable leg members 23, 23 in their adjusted positions, whereby the frame 13 is rigidly supported in its correct adjusted upstanding position as long as the user remains thereon.

While a specific embodiment of an improved orchard ladder has been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. In an orchard ladder, a supporting frame, respective leg members slidably connected to opposite sides of said supporting frame, respective cable guide members at the lower portions of said opposite sides, a first cable member connecting the lower end portions of said leg members and extending slidably through said cable guide members, respective additional cable members connected at their outer ends to the upper end portions of said leg members and extending slidably through said cable guide members, and means connecting the inner ends of said additional cable members.

2. In an orchard ladder, a supporting frame, respective leg members slidably connected to opposite sides of said supporting frame, respective cable guide members at the lower portions of said opposite sides, a first cable member connecting the lower end portions of said leg members and extending slidably through said cable guide members, respective horizontal clamping plates disposed above and below the intermediate portion of said first cable member, respective yoke members disposed around said clamping plates and pivotally connected to the lower clamping plates with their bight portions overlying the upper clamping plates, respective additional cable members connected at their outer ends to the upper end portions of said leg members and extending slidably through said cable guide members, and means connecting the inner ends of said additional cable members to the respective yoke members below the lower clamping plate, whereby outward force on said additional cable members rotates the bight portions of said yoke members toward said upper clamping plate to exert clamping force on the upper clamping plate.

3. In an orchard ladder, a supporting frame, respective leg members slidably connected to opposite sides of said supporting frame, respective cable guide members at the lower portions of said opposite sides, a first cable member connecting the lower end portions of said leg

members and extending slidably through said cable guide members, respective horizontal clamping plates disposed above and below the intermediate portion of said first cable member, respective yoke members disposed around said clamping plates and pivotally connected to the lower clamping plate with their bight portions overlying the upper clamping plate, spring means connecting the portions of said yoke members below the lower clamping plate and biasing the bight portions of said yoke members away from said upper clamping plate, respective additional cable members connected at their outer ends to the upper end portions of said leg members and extending slidably through said cable guide members, and means connecting the inner ends of said additional cable members to the respective yoke members below the lower clamping plate, whereby outward force on said additional cable members rotates the bight portions of said yoke members toward said upper clamping plate to exert clamping force on the upper clamping plate.

4. In an orchard ladder, a supporting frame, respective leg members slidably connected to opposite sides of said supporting frame, respective cable guide members at the lower portions of said opposite sides, a first cable member connecting the lower end portions of said leg members and extending slidably through said cable guide members, respective horizontal clamping plates disposed above and below the intermediate portion of said first cable member, respective yoke members disposed around said clamping plates and pivotally connected to the lower clamping plate with their bight portions overlying the upper clamping plate, a coiled spring connecting the portions of said yoke members below the lower clamping plate and biasing said bight portions of the yoke members away from said upper clamping plate, respective additional cable members connected at their outer ends to the upper end portions of said leg members and extending slidably through said cable guide members, and means connecting the inner ends of said additional cable members to the respective yoke members below the lower clamping plate, whereby outward force on said additional cable members rotates the bight portions of said yoke members toward said upper clamping plate to exert clamping force on the upper clamping plate.

5. In an orchard ladder, a supporting frame, respective leg members slidably connected to opposite sides of said supporting frame, respective cable guide members at the lower portions of said opposite sides, a first cable member connecting the lower end portions of said leg members and extending slidably through said cable guide members, respective horizontal clamping plates disposed above and below the intermediate portion of said first cable member, respective yoke members disposed around said clamping plates and pivotally connected to the lower clamping plate with their bight portions overlying the upper clamping plate, said yoke members having portions depending below said lower clamping plate, spring means

connecting said depending portions of said yoke members and biasing the bight portions of said yoke members away from said upper clamping plate, respective additional cable members connected at their outer ends to the upper end portions of said leg members and extending slidably through said cable guide members, and means connecting the inner ends of said additional cable members to said depending portion of the respective yoke members below the lower clamping plate, whereby outward force on said additional cable members rotates the bight portions of said yoke members toward said upper clamping plate to exert clamping force on the upper clamping plate.

6. In a ladder, a supporting frame, a rearwardly extending support member connected to the frame, respective cable guide members at the lower portions of said opposite sides, a first cable member connecting the lower end portions of said leg members and extending slidably through said cable guide members, respective additional cable members connected at their outer ends to the upper end portions of said leg members and extending slidably through said cable guide members, means connecting the inner ends of said additional cable members, and a clamp releasably engaging said first cable member, said connecting means including clamp closing members connected to the clamp and operable by outward pull on said additional cable members to close the clamp on said first cable member.

7. In a ladder, a supporting frame, respective leg members slidably connected to opposite sides of said supporting frame, respective cable guide members at the lower portions of said opposite sides, a first cable member connecting the lower end portions of said leg members and extending slidably through said cable guide members, respective horizontal clamping plates disposed above and below the intermediate portion of said first cable member, respective yoke members disposed around said clamping plates and pivotally connected to the lower clamping plates with their bight portions overlying the upper clamping plates, respective additional cable members connected at their outer ends to the upper end portions of said leg members and extending slidably through said cable guide members, means connecting the inner ends of said additional cable members to the respective yoke members below the lower clamping plate, whereby outward force on said additional cable members rotates the bight portions of said yoke members toward said upper clamping plate to exert clamping force on the upper clamping plate, and a rearwardly extending support member hingedly connected to said supporting frame.

References Cited in the file of this patent

UNITED STATES PATENTS

1,118,199	Hawk	Nov. 24, 1914
2,330,825	Hoit	Oct. 5, 1943
2,835,427	Balcar	May 20, 1958

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,885,133 May 5, 1959

Frederick F. Nelson

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 6, line 14, after "frame," insert -- respective leg members slidably connected to opposite sides of said supporting frame, --.

Signed and sealed this 17th day of November 1959.

(SEAL)
Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents