

July 14, 1942.

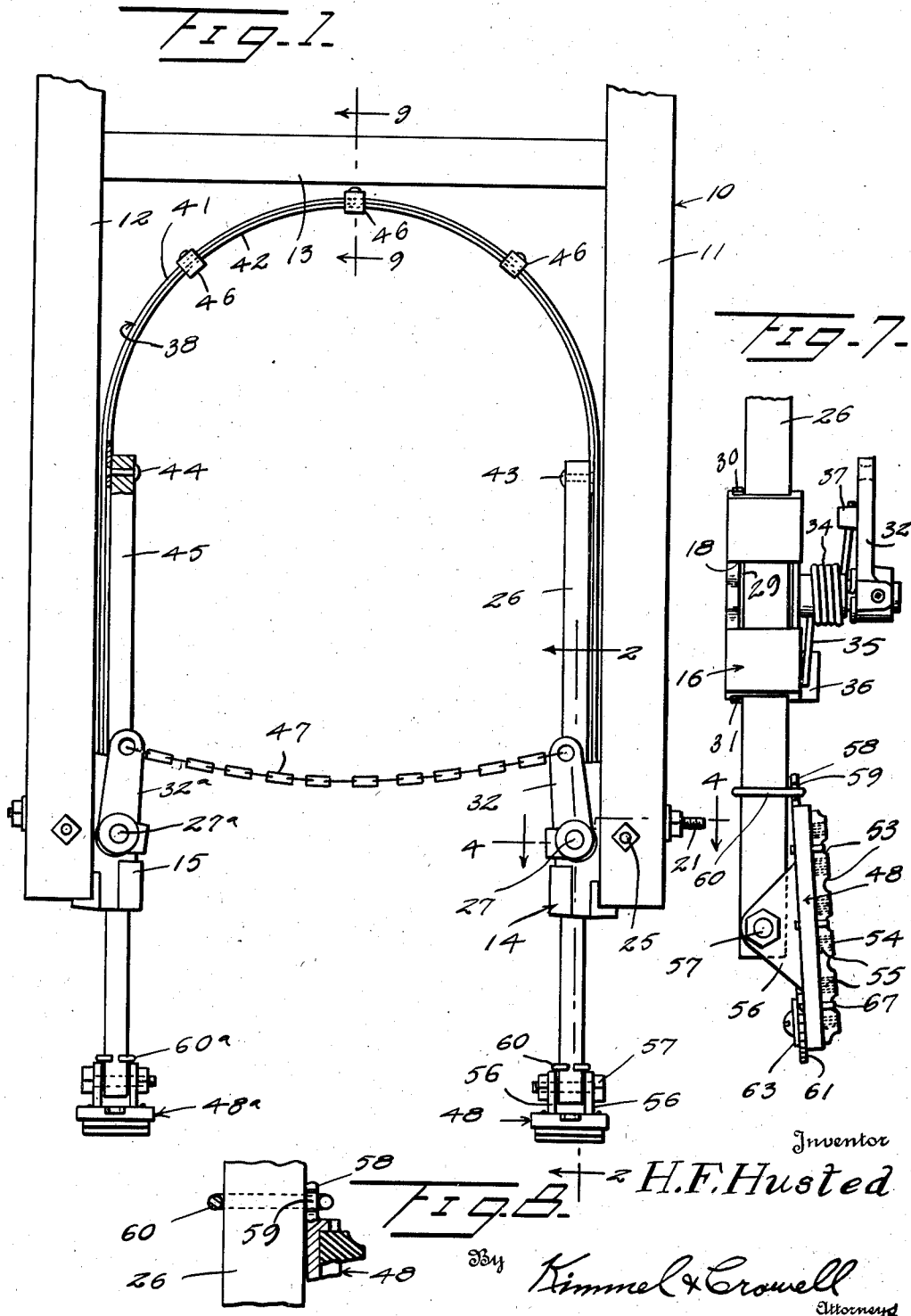
H. F. HUSTED

2,289,499

ADJUSTABLE LADDER EQUALIZER

Filed April 16, 1941

3 Sheets-Sheet 1



July 14, 1942.

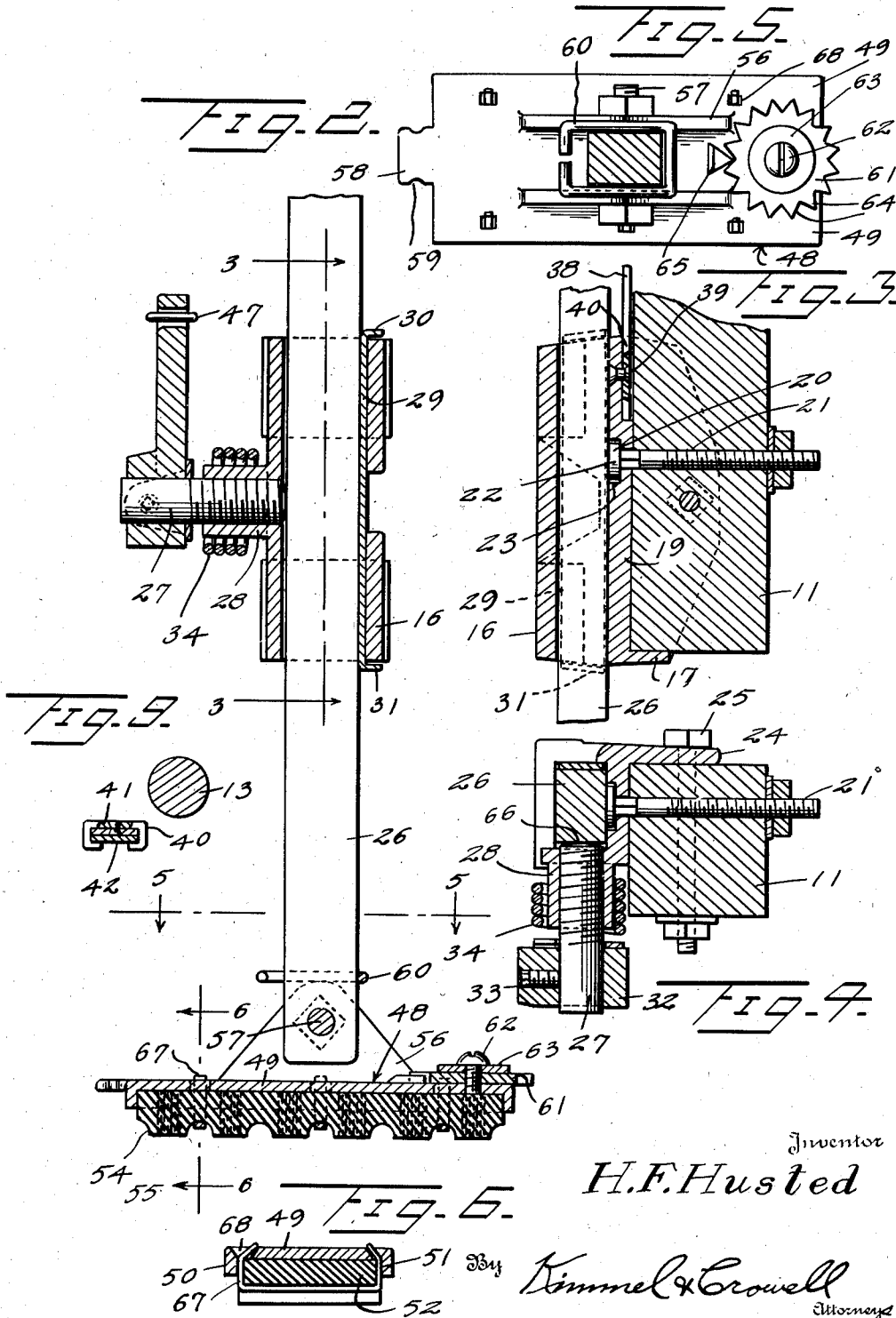
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3 Sheets-Sheet 2



July 14, 1942.

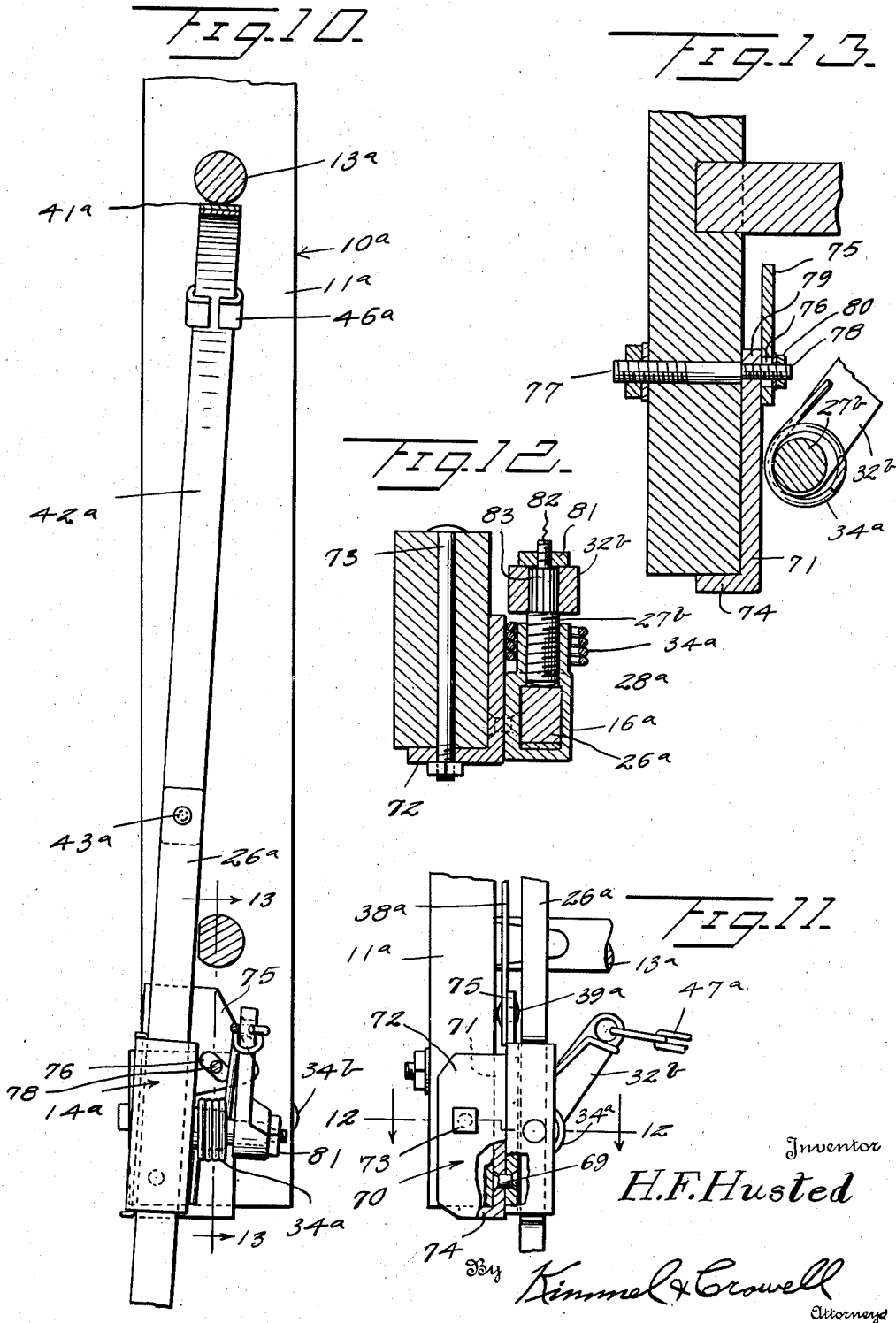
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ADJUSTABLE LADDER EQUALIZER

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UNITED STATES PATENT OFFICE

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ADJUSTABLE LADDER EQUALIZER

Harry F. Husted, Shavertown, Pa., assignor to
Har-Jo Industrial Research Corporation, New-
ark, N. J.

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9 Claims. (Cl. 228—63)

This invention relates to an equalizer for ladders and is an improvement over the construction embodied in my prior Patent No. 1,542,775 which issued June 16, 1925.

An object of this invention is to provide as an attachment for ladders an equalizing means for engagement with the lower portion of a ladder in order to provide a means whereby the lower end of the ladder may be engaged with uneven ground with the ladder in a vertical position and the supporting means at the bottom of the ladder firmly contacted with the uneven ground.

Another object of this invention is to provide an equalizing structure of this kind which includes a means for automatically locking the equalizing structure in adjusted position.

A further object of this invention is to provide an equalizing structure of this kind including a pair of supporting members which are secured one to each side of the ladder and are connected together so that movement of one of the supporting members will effect movement of the other supporting member in the opposite direction.

A further object of this invention is to provide individual locking means for the two equalizing members and a flexible connection between the locking structure whereby both locking members may be released at one time in order to permit the equalizing members to be shifted relative to the side rails of the ladder.

A further object of this invention is to provide in an attachment of this kind an improved means for correlation with the locking structure in order to firmly lock the adjustable supporting members relative to the ladder.

A further object of this invention is to provide an improved base or foot for each supporting member, which is so constructed that it may be disposed at right angles to the supporting members or may be disposed in substantially parallel relation to the supporting members.

A further object of this invention is to provide in a foot or base structure for an attachment of this kind an improved gripping device, which is so constructed that when one portion thereof is worn the device may be adjusted to bring another portion thereof into operation and thus make it unnecessary to entirely replace the gripping element.

A further object of this invention is to provide a ladder equalizing means which is so constructed that it may be mounted on different types of ladders, and which may be adjusted to a particular ladder so that the upper portion of the equal-

izing means will not form an obstruction which might catch on a foot of the user, the upper portion of the equalizing means being positionable beneath a ladder rung and the rung protecting the equalizing means against contact with a foot.

To the foregoing objects and to others which may hereinafter appear, the invention consists of the novel construction, combination and arrangement of parts as will be more specifically referred to and illustrated in the accompanying drawings, wherein is shown an embodiment of the invention, but it is to be understood that changes, variations and modifications may be resorted to which fall within the scope of the invention as claimed.

In the drawings:

Figure 1 is a detail front elevation of an equalizing structure constructed according to an embodiment of this invention, which is mounted on the lower end of a ladder, the ladder being shown in fragmentary form,

Figure 2 is a sectional view taken on the line 2—2 of Figure 1,

Figure 3 is a sectional view taken on the line 3—3 of Figure 2,

Figure 4 is a sectional view taken on the line 4—4 of Figure 1,

Figure 5 is a sectional view taken on the line 5—5 of Figure 2,

Figure 6 is a sectional view taken on the line 6—6 of Figure 2,

Figure 7 is a fragmentary side elevation of one of the equalizing members with the foot portion thereof in substantially vertical position,

Figure 8 is a fragmentary vertical section of the clamping means for the foot,

Figure 9 is a sectional view taken on the line 9—9 of Figure 1,

Figure 10 is a vertical section taken through the lower portion of a ladder having a modified form of equalizing structure mounted thereon,

Figure 11 is a fragmentary front elevation of the structure shown in Figure 10,

Figure 12 is a sectional view taken on the line 12—12 Figure 11, and

Figure 13 is a fragmentary sectional view taken on the line 13—13 Figure 10.

Referring to the drawings, numeral 10 designates generally a ladder structure including side rails 11 and 12 and rungs 13. An equalizing structure is mounted on the lower ends of the rails 11 and 12 and includes a pair of equalizing members, generally designated as 14 and 15. The two equalizing members 14 and 15 are of like construction and the description of one of these

devices will apply equally as well to the description of the other device.

The equalizing device 14 includes a substantially tubular guide member 16, which is formed at the lower end thereof with a right angularly disposed flange 17 engageable beneath the lower end of the rail 11. The guide 16 is provided with a cut-out 18 and the outer wall 19 of the guide 16 is formed with an opening 20 through which an attaching bolt 21 is adapted to engage. The head 22 of the bolt 21 is adapted to be countersunk in a recess 23, which is formed in the outer wall 19. The guide member 16 also includes a vertically disposed flange 24 engageable on the rear side of the rail 11, which is adapted to be secured by means of a bolt 25 or the like engaging through the flange 24 and the rail 11.

An elongated slide member 26 is movable lengthwise of the guide member 16 and is rectangular in transverse section. The slide member 16 is adapted to be locked in vertically adjusted position with respect to the guide 16 by means of a threaded locking shaft 27, which is threaded through a boss 28 carried by the guide 16. The inner end of the shaft 27 is adapted to contact with the confronting face of the slide member 26, so as to bind slide member 26 in the guide 16. In order to provide a means whereby the binding action of the slide 26 with respect to the guide 16 may be facilitated, I have provided an elongated flat strip 29 which is provided with outwardly bent upper and lower end portions 30 and 31 respectively. The flat strip 29 is in the form of a liner which may be of substantially soft metal, such as copper or the like, which will frictionally engage the confronting face of the slide 26 and will hold the slide 26 against movement relative to the guide 16 as the slide 16 is locked by means of the threaded shaft 27.

The shaft 27 at its outer end has secured thereto a right angularly disposed lever or arm 32 which may be fixed to the shaft 27 by means of a set screw 33 or other suitable fastening means. The shaft 27 is adapted to be normally urged to a slide locking position by means of a substantially heavy coil spring 34, which engages about the boss 28 and has one end thereof anchored, as at 35, to a lug 36 carried by the guide 16. The other end of the spring 34 is adapted to engage a lug 37 which is carried by the arm 32.

An elongated flat bowed resilient strip 33 is connected at one end, as at 39, to the guide member 16 engaging in a recess 40 formed in the rear wall 19 of the guide 16. The opposite end of the flat resilient strip 38 is adapted to be secured to the equalizing member 15 at the opposite side of the ladder. The upper end portion of the strip 38 is formed on an arc, as at 41, and constitutes a guide for a flat resilient tie member 42. The tie member 42 is secured, as at 43, to the upper end of the slide member 26 and the opposite end of the strip 42 is secured as at 44 to the upper end of the slide member 45. The tie member 42 provides a means whereby when one of the slide members is moved upwardly with respect to its associated rail the other of the slide members will be moved downwardly in the same proportion. The bowed guide member 41 has secured thereto a plurality of clips or reverted guide members 46, which engage at least partly about the under side of the tie strip 42 so as to constantly hold the strip 42 with the outer face thereof contacting with the under face of the resilient guide strip 41.

The equalizing member 15 is constructed simi-

lar to the equalizing member 14 with the exception that the locking shaft 17a, which has secured thereto a shaft operating arm 32a, has the threads thereof pitched oppositely from the pitch of the threads on the shaft 27. A flexible connecting member 47 connects the two shaft operating arms 32 and 32a together and extends between the rails 11 and 12, as shown in Figure 1. In this manner the flexible connecting member 47 may be engaged by a foot so as to press this member downwardly and thereby rock the two arms 32 and 32a toward each other in order to rotate the slide locking shafts 27 and 27a to a released position. When the two shafts 27 and 27a are in the released position, pressure may be applied from above to the ladder 10 so as to move one or the other of the slide members 26 or 45 upwardly and at the same time the opposite slide member will move downwardly into contact with the ground or other uneven surface.

In order to provide a means whereby the lower end of the slide members 26 and 45 may be firmly engaged with the ground or surface, I have provided a foot member generally designated as 48, which is secured to the slide member 26. The slide member 45 has a similar foot member 48a secured to the lower end thereof. The foot member 48 comprises a base plate 49 provided with downwardly extending marginal edges or flanges 50 forming a pocket or recess 51. A rubber friction member 52 is adapted to be seated in the recess 51 and to project below the lower edges of the flanges 50 as shown in Figures 6 and 7. The friction member 52 is provided in the lower face thereof with a plurality of transversely disposed cutouts 53 forming a plurality of spaced apart gripping members 54. The rubber friction member 52 is provided with transversely extending fiber members 55, which coact with the resilient friction elements 54 in resisting sliding movement of the friction member 51 and also constitute a reinforcing means for the gripping members 54.

The plate 49 is provided with a pair of spaced apart parallel ears 56, which engage on opposite sides of the slide member 26 and a bolt 57 engages through the ears 56 and the lower end portion of the slide member 26, so as to thereby pivotally mount the foot member 48 on the lower end of the slide member 26. The slide member 26 at one end thereof is provided with an outwardly extending lug 58, which is formed with a pair of notches 59 in the opposite edges thereof, and a looped foot clamping member 60 is loosely mounted on the lower portion of the slide member 26 and is adapted, as shown in Figure 7, to engage the lug 58 and within the notches 59, so as to hold the foot member 48 in substantially a vertical position. A gripping member 61 is pivotally mounted on the outer side of the plate 49 adjacent the end thereof oppositely from the lug 58, being pivotally mounted on a bolt or screw 62. A washer 63 is interposed between the head of the bolt or screw 62 and the outer face of the gripping member 61. The gripping member 61 is formed with a plurality of triangularly-shaped teeth 64 and the gripping member 61 is so mounted on the foot 48 that several of the teeth 64 will project outwardly beyond the adjacent flange 50 of the plate 49, as shown in Figure 5. In this manner a relatively sharp friction member or grip element is provided at one end of the foot 48 so that if the surface to be engaged by the ladder is such that the rubber friction member 51 will not firmly hold the lower end of the ladder 10 against sliding movement, the foot 48 can be

raised so as to bring the gripping member 61 into operative position.

The gripping member 61 is held in its adjusted position with respect to the plate 49 by means of a triangularly-shaped locking member 65, which is formed integral with the outer side of the plate 49 and is adapted to engage in the valley between a selected pair of teeth 64. The lower end of the slide member 45 has rockably secured thereto a foot member 48a which is similar in every detail to the foot member 48 and which may be locked in a raised position by means of a split locking ring 60a in the same manner as the ring 60 is adapted to lock the foot member 48 in the position shown in Figure 7.

In the use and operation of this device the two equalizing members 14 and 15 are adapted to be secured to the lower ends of the ladder rails 11 and 12 with the equalizing members on the inner sides of these rails. The bottom flanges 17 of the guide members 16 are adapted to take up any strain caused by weight of the ladder 10 to thereby relieve the attaching bolts 21 and 25 of considerable strain. In the event the equalizing member 14 is on the high side of the ground the flexible connecting member 47 may be pressed downwardly at substantially the middle so as to swing the arms 32 and 32a inwardly toward each other and move the locking shafts 27 and 27a to a released position. The weight of the ladder 10 on the slide member 26 will cause this member to move upwardly in the guide 16 and at the same time the slide member 45 will be forced downwardly by the resilient tie member 42, which will move lengthwise of the guide 41 and to the left as viewed in Figure 1.

When the foot 43a is in contact with the depression or lower surface of the ground the flexible member 47 may be released thereby permitting the shafts 27 and 27a to be rotated by their respective rotating springs 34 to a slide locking position. Preferably the inner ends of the shafts 26 are convex, as at 66, and the pressure of the shafts 27 and 27a against the adjacent sides of the slide members 26 and 45 respectively tightly hold the opposite sides of these slides against relatively soft holding strip 29. The friction members 52 carried by each foot are adapted to be removably mounted within the recess or pockets 51 by means of a plurality of clips or clamping members 67 which engage through recesses 68 formed in the plate 49 and the free ends of the clips 67 are bent inwardly toward each other as shown in Figure 6. The clips 67 engage with the transverse recesses 53 of the friction members 52, as shown in Figure 2.

Referring now to Figures 10 to 13 inclusive, the numeral 10a designates generally a ladder structure including side rails 11a and rungs 13a. An equalizing structure generally designated as 14a is mounted on each side rail 11a on the inner side thereof and adjacent the lower end thereof. The equalizing structure 14a comprises a tubular guide member 16a which is substantially rectangular in transverse section and within which an elongated slide member 26a is slidably mounted. The guide member 16a has the outer wall thereof pivotally secured as by a pivot member 69 to an angle-shaped attaching member generally designated as 70. The attaching member 70 includes a plate 71 which is adapted to engage against the inner face of the rail 11a and also includes a right angular outer or forward flange 72 secured as by a fastening device 73 to the forward side of the rail 11a. The attaching member 70 also

includes a bottom flange 74, which is adapted to engage the lower end of the rail 11a so as to relieve the bolt 73 of strain in the support of the ladder 10a from the slide members 26a.

The pivot member 69 is constructed in the form of a rivet which firmly holds one portion of the guide 16a on the attaching plate member 70 but permits pivotal adjustment of the guide member 16a on the attaching member 70. The guide member 16a has formed integral therewith a plate 75, which is formed with an elongated slot or opening 76. A transversely extending bolt 77 is adapted to engage through the rail 11a and the bolt 77 is formed with a reduced threaded stud 78 loosely engaging in the slot 76. The stud 78 extends through an opening 79 formed in the plate 71. A nut 80 is adapted to be threaded onto the stud 78 so that the plate 76 may be locked in its adjusted position with respect to the attaching member 70. Preferably the position of the plate 75 is such that the slide member 26a will be inclined inwardly and upwardly as shown in Figure 10. The slide member 26a is adapted to be locked against movement by means of a threaded shaft 27b, which is threaded through a boss 28a formed integral with the guide member 16a. A spring 34a normally urges the shaft 27b in a direction to lock the slide member 26a against movement relative to the guide member 16a. The shaft 27b has splined thereon a releasing lever or arm 32b which has one end of a chain or flexible member 47a connected therewith. A nut 81 is threaded onto a reduced threaded stud 82 carried by the shaft 27b. By providing the splines 83 on the shaft 27b on complementary splines in the arm 32b the arm 32b can be adjusted to any desired position with respect to the shaft 26b.

One end of a bowed or U-shaped guide strip 38a is fixed, as at 39a, to the plate 75 and extends upwardly in the direction of a rung 13a so that the arcuate portion 41a of the guide strip 38a will be disposed substantially beneath the rung 13a. In this manner the upper portion 41a of the guide strip 38a will be so positioned that it will not be engaged with a foot of the user of the ladder or form an obstruction which might catch on the foot of the user. A bowed resilient slide strip 42a is secured, as at 43a, to the upper ends of the slide members 26a and has the outer face thereof disposed in sliding contact with the inner face of the bowed guide member 38a. A plurality of guide clips 46a are fixed to the guide strip 38a and engage about the slide member 42a so as to hold the slide strip 42a in sliding contact with the guide strip 38a.

With a construction as shown in Figures 10 to 13 inclusive the equalizing means may be attached to different types of ladders embodying side rails of different widths and the resilient bowed guide and slide strips may be adjusted as shown in Figure 10 so that the upper arcuate portions thereof will be positioned directly beneath a ladder rung. In this manner the upper arcuate portions of these strips will not catch on the foot of the user. In other respects the structure shown in Figures 10 to 13 inclusive is similar to that shown in Figures 1 to 9 inclusive.

What I claim is:

1. An equalizing supporting means for a ladder comprising a pair of tubular guide members, means for securing said members to the opposite sides of the ladder, a slide member in each guide member, a bowed guide strip secured at the free ends thereof to said guide members and extending

upwardly therefrom, a resilient bowed tie member fixed at the ends thereof to the upper ends of said slide members and slidable relative to said guide strip, a gripping foot pivotally carried by the lower end of each slide members, a slide locking member threadably carried by each tubular guide member, yieldable means constantly urging said locking members to a locking position, and a flexible common operating member for said locking members loosely suspended therebetween whereby to simultaneously rotate both locking members to a released position, release of said locking members permitting movement of said slides in opposite directions whereby one foot may be positioned in a different horizontal plane from the other foot to compensate for uneven foot engaging surfaces.

2. An equalizing supporting means for ladders comprising a pair of vertically movable slide members, guide means for said members, means securing said guide means to the sides of the ladder, means connecting said slide members together for simultaneous movement in opposite directions, a threaded holding member for each slide carried by said guide means, means normally urging each holding member to a slide locking position, a ground gripping foot carried by each slide at the lower end thereof, and a flexible common releasing member for said holding members.

3. An equalizing supporting means for ladders comprising a pair of vertically movable slide members, guide means for said members, a bowed guide strip secured at the free ends thereof to said guide members, a bowed tie member secured to said slide members and slidably engaging said guide strip, a foot at the lower end of each slide member, a slide locking member threadably carried by said guide means, a friction element carried by said guide means and engageable with a slide on the side thereof opposite from a locking member, means normally urging said locking members to a slide locking position, and a flexible common releasing member connected with said locking members.

4. An equalizing supporting means for ladders comprising a pair of vertically movable slide members, a guide for each member, means securing said guides to the opposite sides of the ladder, a foot at the lower end of each slide, a movable locking member carried by each guide, means urging a locking member to a normally locked position for locking a slide relative to a guide, and a flexible releasing member connected with each locking member and loosely suspended therebetween.

5. An equalizing supporting means for ladders comprising a pair of vertically movable slide members, a guide for each member, means securing said guides to the opposite sides of the ladder, a foot at the lower end of each slide, a rotatable locking member carried by each guide, yieldable means normally rotating a locking member to a slide locking position, and a flexible common releasing member for rotating said locking members to a released position, said releasing

member being connected with and loosely suspended between said locking members.

6. An equalizing supporting means for ladders comprising a pair of vertically movable slide members, a guide for each member, means securing said guides to the opposite sides of the ladder, a foot at the lower end of each slide, a threaded locking member carried by each guide, the threads of one locking member being oppositely pitched from the threads of the other locking member, yieldable means normally rotating a locking member to a slide locking position, and a flexible common releasing member for rotating said locking members to a released position.

7. An equalizing supporting means for ladders comprising a pair of vertically movable slide members, a tubular guide for each member, an attaching plate for each guide means pivotally securing a guide to a plate, means securing said plate to a ladder side, an arched guide strip connecting said guides together, an arched slide strip connected to said slide members and slidably engaging said guide strip, means engaging a plate and a guide for locking said guide relative to said plate whereby said guide and slide strips may be positioned beneath a ladder rung, a threaded locking member carried by each guide and engageable with a slide member for locking a slide member against movement relative to a guide, the threads of one locking member being oppositely pitched from the threads of the other locking member, yieldable means normally rotating a locking member to a slide locking position, and a common releasing member for rotating said locking members to a released position.

8. An equalizing supporting means for ladders comprising a pair of vertically movable slide members, a guide for each member, means securing said guides to the opposite sides of the ladder whereby said guide members may be angularly adjusted relative to the ladder sides, a foot at the lower end of each slide, a rotatable locking member carried by each guide, yieldable means normally rotating a locking member to a slide locking position, and a common releasing member for rotating said locking members to a released position.

9. An equalizing supporting means for ladders comprising a pair of vertically movable slide members, guide means for said members, a bowed guide strip secured at the free ends thereof to said guide members, a bowed tie member secured to said slide members and slidably engaging said guide strip, an attaching plate for each guide, means pivotally securing a plate to a guide whereby said guide means may be angularly adjusted relative to the length of the ladder sides, means locking a plate relative to a guide, a foot at the lower end of each slide member, a slide locking member movably carried by said guide means, means normally urging said locking members to a slide locking position, and a common releasing member connected with said locking members.

HARRY F. HUSTED.