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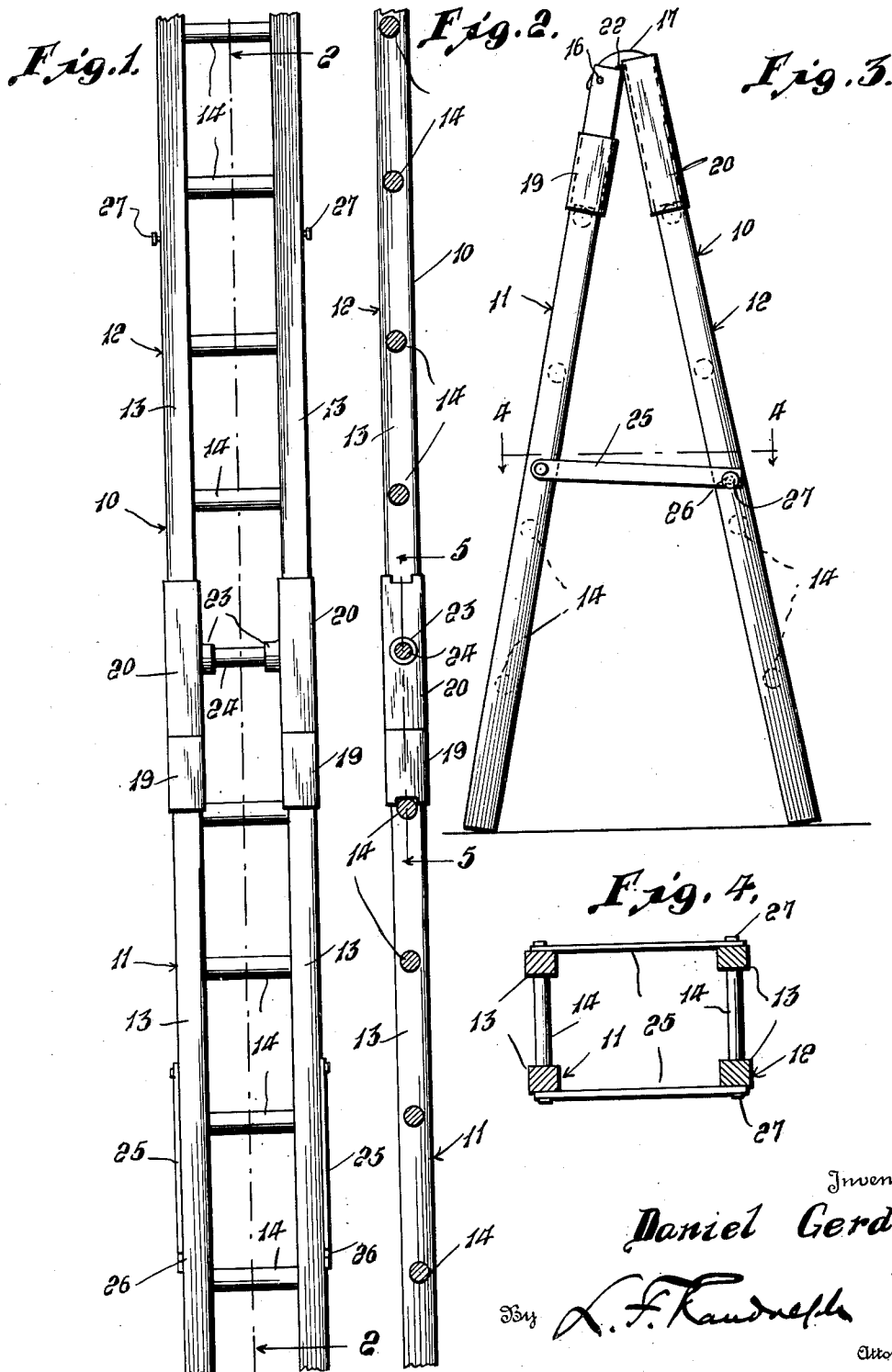
D. GERDES

2,192,830

TWO-WAY LADDER

Filed Oct. 27, 1938

2 Sheets-Sheet 1



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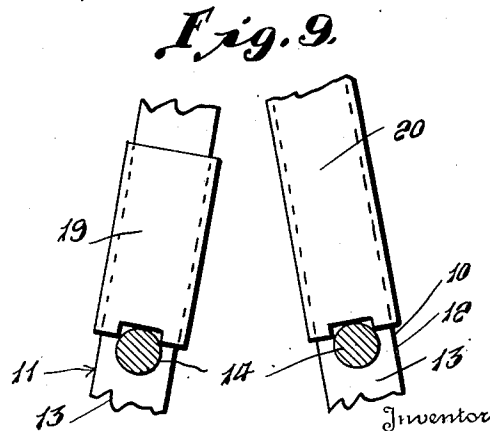
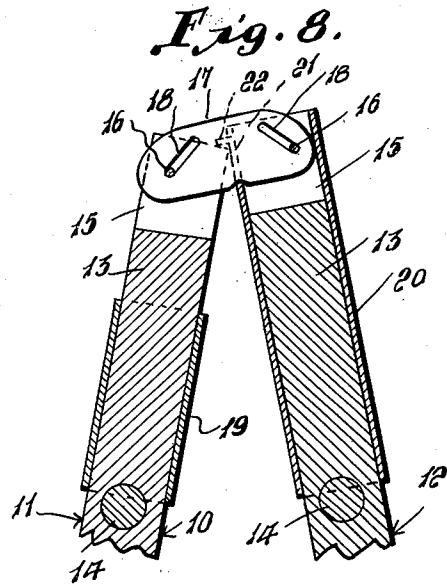
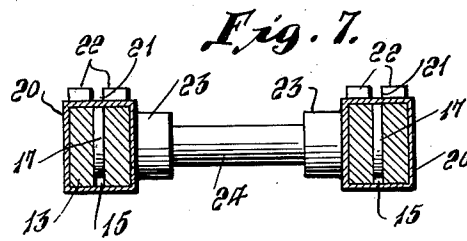
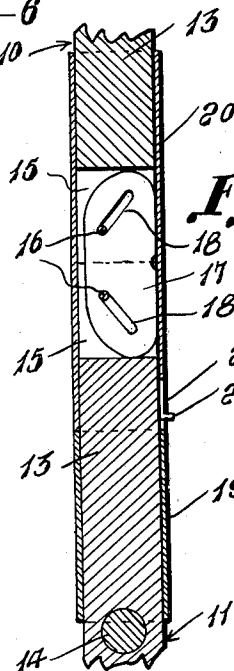
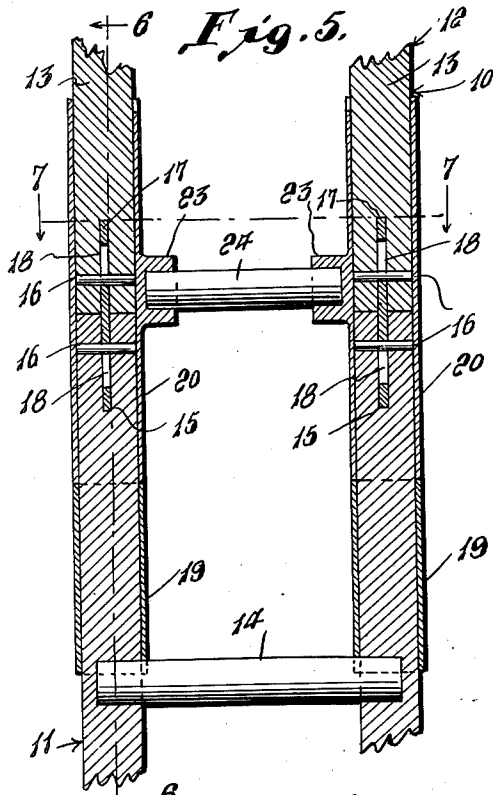
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2 Sheets-Sheet 2



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## UNITED STATES PATENT OFFICE

2,192,830

## TWO-WAY LADDER

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6 Claims. (Cl. 228—23)

This invention relates to an improved ladder adapted for use either as a straight ladder, step-ladder or extension ladder.

It is an aim of this invention to provide an improved ladder of simple, durable and economical construction which may be readily folded into half of its length for storage or for use as a straight ladder, provided with means for extending the ladder to twice its folded length and for rigidly maintaining it in an extended position or for assembling it in the form of a step-ladder.

More particularly, it is an aim of this invention to provide improved means for pivotally connecting the ladder sections whereby the adjacent ends of the rails will be in abutting engagement when extended and means carried by said ends and movable relatively thereto to overlap the pivoted portions for rigidly maintaining them in an extended position relatively to each other.

Still a further object of the invention, is to provide pivotally mounted brace members carried by one of the ladder sections to releasably engage the other section to position the sections at acute angles to each other to provide a step-ladder.

Other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, which illustrate a preferred embodiment thereof, and wherein:

Figure 1 is a plan view showing the ladder in an extended position,

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

Figure 3 is a side elevational view showing the ladder sections assembled as a stepladder,

Figure 4 is a horizontal sectional view taken along the line 4—4 of Figure 3,

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

Figure 6 is a longitudinal sectional view taken along the line 6—6 of Figure 5,

Figure 7 is a transverse sectional view taken along the line 7—7 of Figure 5,

Figure 8 is a fragmentary sectional view of the parts seen in Figure 6, shown in a partially folded position as they would appear in Figure 3, and

Figure 9 is a fragmentary side elevational view, partly in section, showing the sleeve members as they would appear when the ladder sections are folded or partially folded.

Referring more particularly to the drawings, wherein like reference characters designate like or corresponding parts throughout the different views, 10 designates generally the ladder which

includes the corresponding sections 11 and 12 each of which is formed of a pair of side rails 13 connected by a plurality of spaced rungs 14.

The adjacent ends of the rails 13 of both sections are slotted, as indicated at 15, and are provided with the pins 16 which extend through the slotted portions 15. The corresponding adjacent ends of the rails 13 are connected by the links 17, provided with the slots 18 which slidably and pivotally engage the pins 16, as best seen in Figure 8. As seen in Figure 6, slots 18 permit the links 17 to slide relatively to the rails 13 so as to be disposed within said slots when the ladder 10 is extended, as in Figure 1, so that the ends of the rails 13 are positioned in abutting engagement to rest one upon the other rather than on the links 17. When the sections 11 and 12 are folded to form a stepladder, as in Figure 3, or disposed in a fully folded position, not shown, the links are extended relatively to the rails and the pins 16 engage the outer ends of the slots 18, as seen in Figure 8 rather than the inner ends, as seen in Figure 6, when the ladder is extended.

A pair of relatively short sleeves or collars 19 are mounted on the rails 13 of the section 11 resting against the top rung 14 thereof and projecting upwardly or toward the pivoted ends of the rails. Sleeves 19 are of the same cross sectional shape as the rails 13 and may be loosely mounted thereon or rigidly secured thereto, as desired. A pair of sleeve members 20 are mounted on the side rails 13 of section 12 between their pivoted ends and the first rung 14 and are substantially longer than the sleeve members 19 to extend, when in a retracted position as seen in Figure 8, to the pivoted ends of these rails, and as seen in dotted lines in Figure 8, are provided with the slots 21 to receive the links 17 when the ladder sections are folded or partially folded. Sleeves 20 on either side of slots 21, are provided with the struck-out portions forming the lugs 22 which rest on the upper ends of the rails 13 of section 11, when said sections are positioned to form a stepladder, to rigidly hold said ends relatively to each other as will hereinafter be more fully explained.

When the ladder sections are extended as in Figure 1, sleeves 20 may be moved to their projected positions to engage sleeves 19 and to enclose the pivoted ends of the rails 13, and as these sleeves fit snugly on the rails the two sections will be thereby rigidly held in their extended position. Section 12 is intended to be the upper section of the ladder so that the sleeves 20 will be held by gravity in the position as seen

in Figure 1, to hold the ladder sections extended until the sleeves are manually retracted, to the position as seen in Figure 3. The sleeves 18 and 20 may be provided with notches on their inner sides and at their remote ends, relatively to each other, to engage the rungs 14 as indicated in Figure 9.

It will be noted, that when the ladder sections 11 and 12 are extended, as in Figure 1, that the adjacent rungs 14 of the two sections are spaced much farther apart than the rungs of each section and to bridge this space, the sleeves 20 are provided with the inwardly extending sockets 23 in which the opposite ends of a rung 24 are supported. Rung 24 also connects the sleeves 20 so that they may move only as a unit.

A pair of brace members 25 are pivotally connected to the side rails 13 of the section 11 intermediate of the ends of said rails and are provided with the notches 26, adjacent their free ends. Headed studs 27 project outwardly from the side rails 13 of the section 12 to connect with notches 26 when the sections are disposed at an acute angle to each other, as in Figure 3, so that the braces 25 will hold the sections in position to form a stepladder, and in this position the lugs 22 engage the ends of the rails 13 of section 11 to prevent play between the pivoted ends of these sections.

From the foregoing it will be seen, that the sections 11 and 12 may readily be folded one against the other for storage or for use where only a short straight ladder is required. By partially opening the sections to the position as seen in Figure 3, the ladder 10 may be employed as a stepladder with the free ends of the rails 13 of each section resting on the ground or other supporting surface and with the sections connected intermediate of their ends by the braces 25, as heretofore explained. To extend sections 11 and 12, from their positions forming a stepladder, braces 25 are disconnected from section 12 which is then swung inwardly and moved downwardly slightly to disengage the lugs 22 from the upper edges of the rails 13 of the section 11. Section 12 may then be swung on its pins 16, as a pivot, through an arc of substantially 180° and then moved to position the pivotally connected ends of its rails 13 in abutting engagement with the corresponding ends of rails 13 of section 11, as seen in Figures 5 and 6. By extending the sections 11 and 12 relatively to each other and by moving the collars 20 to the position as seen in Figure 1, the ladder is adapted for use as a long straight ladder with the rung 24 forming one of the rungs thereof. In this position, the braces 25 hang against the sides of the rails 13 of the section 11, as seen in Figure 1.

If desired, the rungs of one or both of the sections may be made in the form of steps and various other modifications and changes may obviously be made and are contemplated, and the right is reserved to make such variations as do not depart from the spirit and scope of the in-

vention as hereinafter defined by the appended claims.

I claim as my invention:

1. A ladder comprising two corresponding sections, each formed of spaced side rails connected by a plurality of spaced rungs, means pivotally connecting said sections at their corresponding ends for folding the sections and for disposing them at an acute angle to each other to provide a stepladder, said means being slidably and pivotally connected to each of the sections, sleeve members slidably mounted on the rails of said sections between their upper rungs and their pivoted ends, and one pair of said sleeve members being movable into engagement with the pivoted ends of said sections when they are disposed in the same plane, to retain the pivotally connected ends in end to end relationship to form a straight ladder.

2. A ladder comprising two ladder sections each formed of spaced rails connected by a plurality of rungs, links slidably and pivotally connected to the adjacent ends of said sections for pivotally connecting the sections, sleeve members mounted on the side rails of the pivoted ends of said sections, and one pair of said sleeve members being slidably mounted to engage and enclose said pivoted ends for rigidly retaining said sections in an extended position relatively to each other and with their pivoted ends in abutting end to end relationship.

3. A device as in claim 2, said slidable sleeve members being connected by a rung disposed between the rungs of the adjacent ends of said sections when said ladder is in an extended position.

4. A device as in claim 2, comprising lugs formed on corresponding ends of the slidably mounted sleeve members for engaging the pivoted end of the other section, when the sections are at an acute angle to each other, to retain the links in extended position relatively to the sections.

5. A ladder comprising two ladder sections each formed of spaced side rails connected by a plurality of spaced rungs, the side rails of the adjacent ends of said sections being slotted and provided with pins extending through said slots, links, provided with slots to engage said pins for pivotally and slidably connecting the rails of the sections to pivotally mount the sections relatively to each other, said sections being movable from a folded to an extended position, said link members being disposed in said slots when the ladder sections are extended to position the adjacent ends of said rails in abutting engagement, and means mounted on the side rails and adjacent ends of said sections for rigidly retaining the sections in an extended position.

6. A device as in claim 5, said means comprising a pair of sleeves mounted on the rails of one section and movable to engage the pivoted ends of said rails.

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