April 4, 1939. H. J. HEIDER 2,152,846

LADDER CONSTRUCTION

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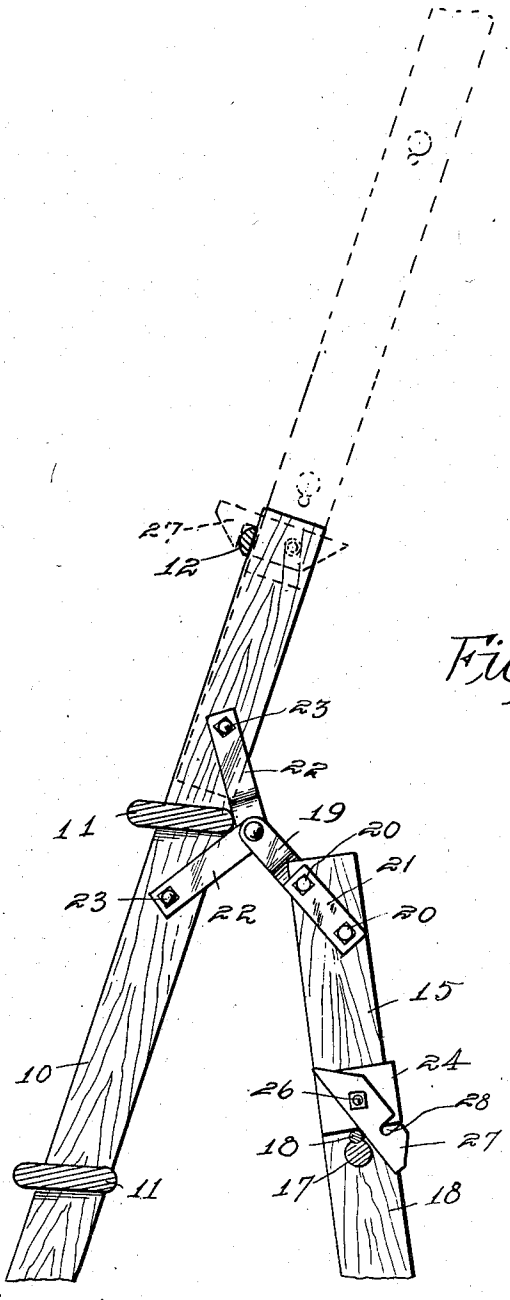


Fig. 1.

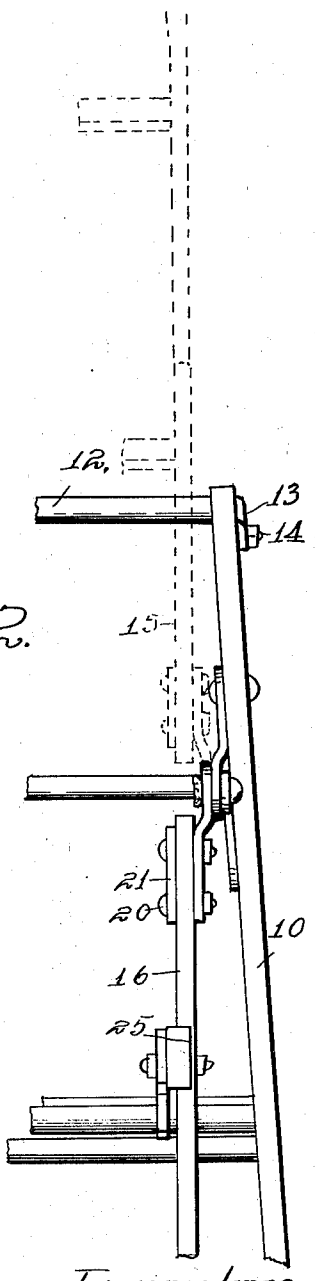


Fig. 2.

Inventor

Henry J. Heider.

by Owing & Hagan Attys

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LADDER CONSTRUCTION

Henry J. Heider, Carroll, Iowa

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3 Claims. (Cl. 228—23)

The object of my invention is to provide improvements in ladders of that type adapted to be utilized either as a step ladder or as an extension ladder, wherein the extension member may be folded downwardly to serve as a prop for the upper end of the lower section. I realize that the broad idea of providing a ladder structure having a convertible member which may be utilized as a prop or as an extension is not new. However, heretofore, great difficulty has been experienced in providing simple and inexpensive means for hinging and rigidly coupling the two sections together when utilized as an extension ladder, and further to provide reliable means for automatically locking the sections together when in said extended position. It is, therefore, the object of my invention to provide an improved ladder comprising a step section and a convertible section having improved means for hinging the sections together so as to form a rigid joint between the two sections when utilized as an extension ladder.

A further object is to provide, in connection with a ladder of the type above described, improved means for hinging the sections together, of simple, durable and inexpensive construction, which is easy to apply.

My invention consists in the construction, arrangement and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawing, in which:

Figure 1 is a vertical sectional view of the upper ends of my improved ladder construction when applied as a step ladder, showing the manner in which my improved hinge construction is applied thereto;

Figure 2 is a back view of the same.

My improved ladder construction comprises a pair of upright side rails 10 having the usual transversely arranged steps 11, the upper one of the steps being supported a considerable distance below the upper ends of the rails 10. Connecting the upper ends of the rails 10 is a cross bar 12, preferably formed of half round structural steel, having its ends 13 bent laterally and overlapping the outer faces of the members 10, and secured in position by suitable bolts 14.

I have also provided what I shall term a convertible section 15 comprising side rails 16 connected by transversely arranged rungs 17 and reinforcing rods 18 for tying the side rails to the rungs 17, the side rails 16 being spaced apart a less distance than the rails 10 and of a length somewhat less than the length of the said rails 10, as illustrated in Figure 1. The outer surface of the upper end of each of the rails 16 is provided with an upwardly and forwardly extending strap 19 secured in position by means of bolts 20 extending through a strap 21 placed on the inner faces of the rails 16, thus providing means whereby said straps 19 may be very rigidly secured to the members 16, the free ends of the members 19 being each pivotally connected to a pair of straps 22 having their opposite ends fixed to the inner faces of the rails 10 of the said section, by means of suitable bolts 23, the bolts 23 being spaced apart a considerable distance, preferably one above and the other below the upper step 11. By spacing the said bolts apart a considerable distance it will be seen that the straps 22 are fixed to the rails in such a manner that any strain applied to the pivoted ends of the straps 22 will be distributed to the side rails at separated points to thereby strengthen the rails against bending strains applied thereto when the section 15 is swung to position in alinement with section 10.

For locking the sections in the last said position, as illustrated in dotted lines in both Figures 1 and 2, I have provided on each of the rails 16 a plate 24 having one edge provided with a laterally extending portion 25 to rest against the back edge of the rail 16, with the face of the plate against the inner face of said rail, said plate being secured in position by means of a stud-bolt 26. The inner end of each of the bolts 26 is provided with a latch bar 27 having a notch 28 for receiving the bar 12 when the section 15 is in its extended position, as illustrated in dotted lines in Figure 1, thus providing means for automatically locking the two sections in their extended position as the convertible section is swung from its vertical position, as shown in solid lines in Figure 1, to its dotted line position. The bar 12 serves to limit the upward and forward movement of the section 15 when it has been swung to position in alinement with the section 10, or, in other words, to prevent the upper end of the said section from bending rearwardly when weight is applied to the central portion of the ladder with its upper end resting against a wall or other support, while the latch device 27 prevents rearward movement of the upper end of the extension relative to the upper end of the step section as the ladder is being moved from one position to another.

From the construction illustrated in the drawing it will be seen that the pivot centers of the members 19 and 22 are positioned a consider-

able distance below the upper ends of the rails 10 so that when the section 15 is in alinement with the section 10, the upper ends of the rails 10 will overlap the lower inner ends of the rails 16 so as to stiffen the joint between the two sections. It will further be seen that the pivot members are of very simple construction which may be mounted on the side rails 10 by means of bolts 23 in previously bored holes by means of templets. By this construction the boring of the holes for the bolts 23 need not be absolutely accurately spaced as it will be readily seen that the members 22 may be secured thereto without difficulty due to the fact that one is pivotally mounted relative to the other. In other words, if the pivot members 22 are formed of a single piece of material having widely separated bolts, it would be necessary to drill the holes accurately in the side rails in order to fit the openings of the hinge members.

Thus, it will be seen that I have provided an improved ladder having a convertible section adapted to be used either as a prop for the upper end of said step section or as an extension when it is desired to increase the length of the ladder, and in connection therewith, improved means for hinging and locking the two sections together to form a rigid construction wherein the connected ends of the sections is stronger and stiffer than either of the sections.

I claim as my invention:

1. A ladder, comprising a step section, a convertible section, means hinging one end of the convertible section to the step section at a point intermediate its ends to provide overlapping end portions, means latching said overlapping ends to the convertible section at points intermediate its ends, said means comprising a pair of outwardly projecting and converging bars secured to each side rail of the step section near its upper end to provide a pivot center near the point of intersection of said bars, a third bar having one end hinged to each pivot and secured to the upper end of the corresponding side rails of the convertible section and inclined thereto, whereby the convertible section may be alined with the said section when moved to its extended position, said latching means comprising a transverse bar connecting the free ends of the rails of the step section, and latch devices carried by the rails of the convertible section adapted to engage and move to latching relation therewith by gravity.

2. A ladder, comprising a step section, a convertible section, means hinging one end of the convertible section to the step section at a point intermediate its ends to provide overlapping end portions, means latching said overlapping ends to the convertible section at points intermediate its ends, said means comprising a pair of outwardly projecting and converging bars secured to each side rail of the step section near its upper end to provide a pivot center near the point of intersection of said bars, a third bar having one end hinged to each pivot and secured to the upper end of one side of the corresponding side rails of the convertible section and inclined thereto, whereby the convertible section may be alined with the said section when moved to its extended position, said latching means comprising a transverse bar connecting the free ends of the rails of the step section, and latch devices carried by the rails of the convertible section adapted to engage and move to latching relation therewith by gravity.

3. A ladder, comprising a step section, a convertible section, means hinging one end of the convertible section to the step section at a point intermediate its ends to provide overlapping end portions, means latching said overlapping ends to the convertible section at points intermediate its ends, said means comprising a pair of outwardly projecting and converging bars secured to each side rail of the step section near its upper end to provide a pivot center near the point of intersection of said bars, a third bar having one end hinged to each pivot and secured to the upper end of one side of the corresponding side rails of the convertible section and inclined thereto, a plate on the opposite side of said rail, a bolt securing the plate, side rail and bar together, whereby the convertible section may be aligned with the said section when moved to its extended position, said latching means comprising a transverse bar connecting the free ends of the rails of the step section, and latch devices carried by the rails of the convertible section adapted to engage and move to latching relation therewith by gravity.

HENRY J. HEIDER.