

May 30, 1944.

H. W. RICHARDS

2,350,129

LADDER

Filed July 20, 1943

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FIG. 1.

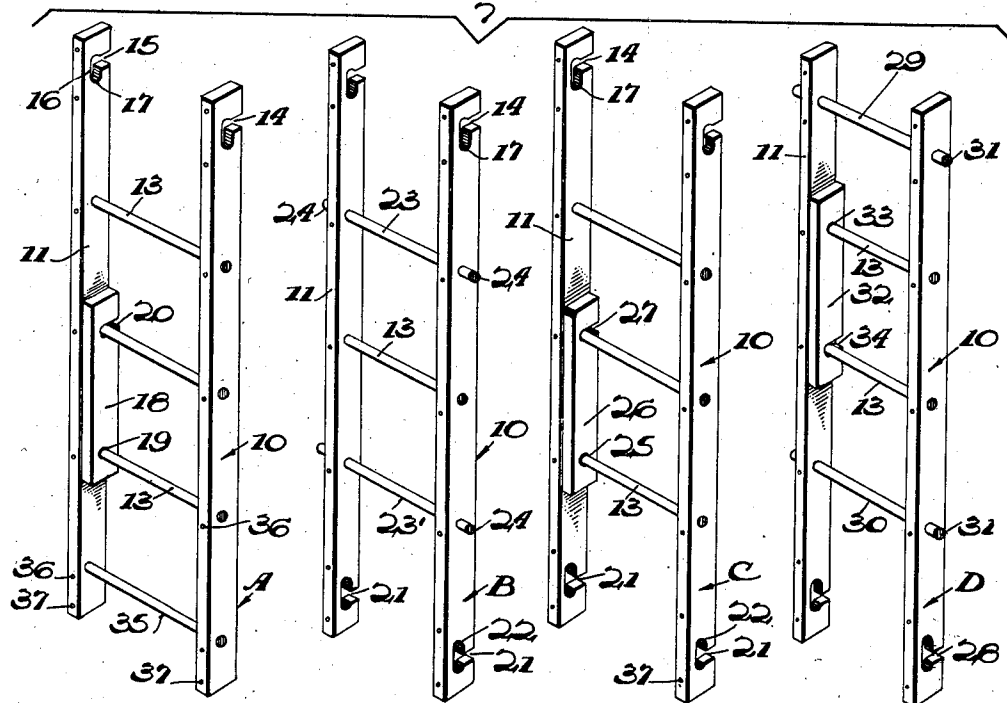
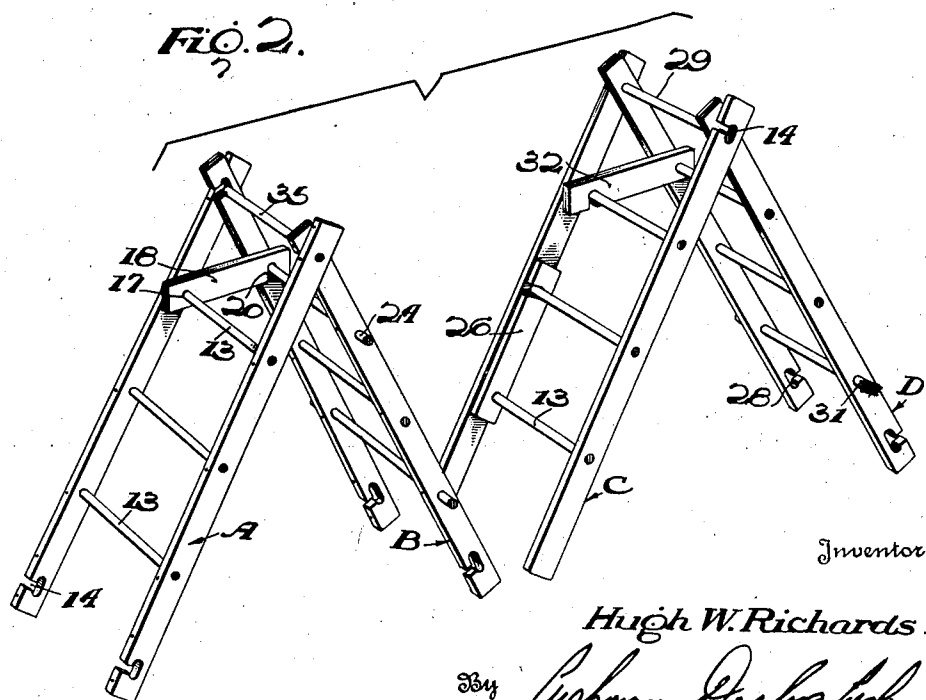


FIG. 2.



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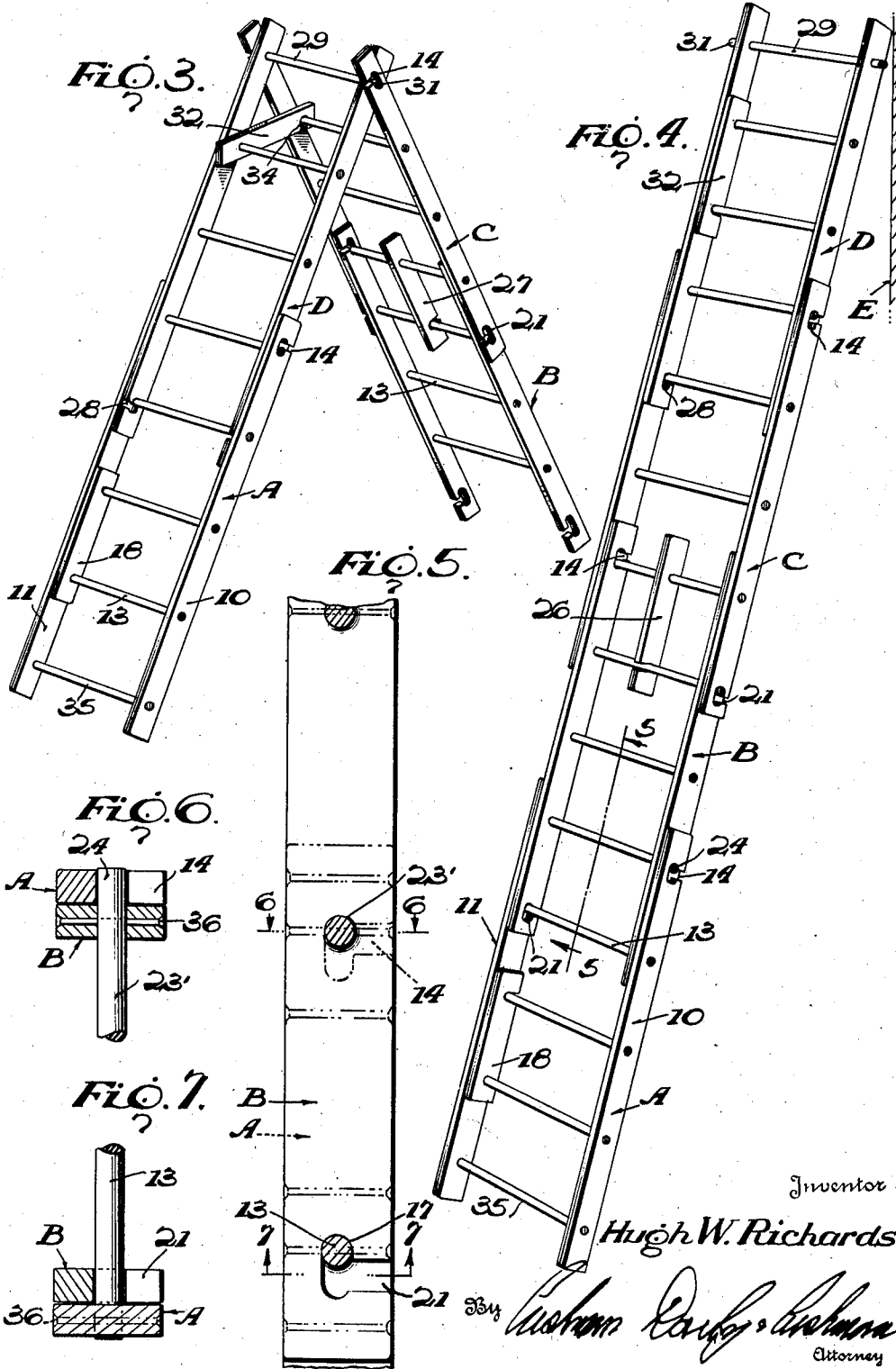
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UNITED STATES PATENT OFFICE

2,350,129

LADDER

Hugh W. Richards, Carrollton, Ga.

Application July 20, 1943, Serial No. 495,484

5 Claims. (Cl. 228—25)

The present invention relates to an improved ladder and more particularly to a combined extension and step-ladder formed of separate sections provided with means whereby the sections may be placed end-to-end to increase the length of the ladder or may be removed from one another and used as individual ladders or converted into either a pair of short step-ladders or a long step-ladder.

An important feature of the invention consists in providing simple, efficient, and economical means for securing and removably interlocking adjacent sections of the ladder together to form a safe, strong, and durable extension ladder. Additionally, means are provided so that the sections may be selectively connected to form a pair of short step-ladders or a long step-ladder.

Other objects and advantages of the invention will become apparent from the following description when taken in conjunction with the accompanying claims and drawings.

Referring to the drawings, in which is disclosed a preferred embodiment of the invention—

Figure 1 is a perspective view showing the sections of the ladder prior to being assembled;

Figure 2 is a perspective view showing the sections combined to form two short step-ladders;

Figure 3 is a perspective view showing the sections arranged to form a large step-ladder;

Figure 4 is a perspective view of the sections connected together to form an extension ladder;

Figure 5 is an enlarged detail sectional view taken along the line 5—5 of Figure 4;

Figure 6 is a detail sectional view taken substantially along the line 6—6 of Figure 5, and

Figure 7 is a sectional view taken substantially along the line 7—7 of Figure 5.

The combined extension and step-ladder may be composed of two or more sections and preferably comprises four separate sections A, B, C, and D, respectively (Figure 1), each of which has spaced side bars 10 and 11 connected by transverse rungs 13. The sections A and C are of the same width and are wider than the sections B and D, and preferably all the sections are of the same length. The section A constitutes the base of the extension ladder, and the side bars 10 and 11 thereof adjacent the upper end are provided with transversely aligned bayonet slots 14 in the sides thereof, each of these slots having a transverse opening 15 that communicates with a vertical elongated slot 16 that extends downwardly below the adjacent wall of the slot 15 so as to form a retaining notch or shoulder 17. The section A carries a spacing or locking member 18 which is pivotally connected at one end as at 19 to one

of the rungs 13 and has its opposite or free end formed with a notch 20, the purpose of which will subsequently be described. The upper ends of the side bars 10 and 11 of each of sections B and C are provided with bayonet slots 14 similar in construction to the slots in section A and also have their lower ends provided with bayonet slots 21 provided with curved shoulders or retaining portions 22 that extend upwardly as contrasted to the downwardly extending shoulder portions 17 in the upper ends of these sections. The top rung 23 and the lower rung 23' of section B have their ends extending outwardly from the side bars 10 and 11, to form the trunnions 24. The lower rung 13 of the section C has pivotally connected thereto as at 25, a locking bar or member 26, and the opposite end of this member is formed with a slot 27. The section D which constitutes the top portion of the extension ladder has the lower ends of its side bars 10 and 11 provided with bayonet slots 28 similar in shape to the slots 21 and also has its upper rung 29 and its lower rung 30 formed with outwardly protruding extensions or trunnions 31. A bar or member 32 is pivoted adjacent one end as at 33 to one of the rungs 13, and at its opposite end is formed with a slot 34. The sections A and C are of the same width and constitute a pair of wide sections and the sections B and D are of the same width to form a pair of narrow sections capable of being selectively interconnected to form ladders of different types. Manifestly, the number of sections may be varied as well as their lengths and the number of rungs in each section.

Assuming it is desired to form an extension ladder, the section A which is wider than the section B is positioned to constitute the base of the ladder, and the lower portion of the section B is positioned between the side bars 10 and 11 of section A, so that the bayonet slots 21 therein will register with the adjacent upper rung 13 of section A, and the lower trunnions 24 will fit within the adjacent slots 14. Upon moving the section B downwardly relative to the section A, the end rungs slide into locking engagement with the shoulder portions 17 and 22 in the slots 14 and 21, respectively, thus insuring the sections being securely and firmly maintained in locking engagement until released by the rungs being moved into alignment with the transverse openings 15 of the slots. The lower portion of the section C is moved into overlapping position relative to the upper portion of the section B so that the bayonet slots 21 in the section C engage the upper trunnions in the section B and the lower rung in section C fits within the adjacent upper

slots 14 of the section B, and upon movement of the section C downwardly relative to the section B, the bayonet slots are caused to be maintained in locking engagement with the adjacent rungs to interlock the sections together. The member 26 may then be swung about its pivot so that the notch 27 in the free end thereof is moved into engagement with the adjacent rung of the section B in order to further insure these sections being positively locked. The lower portion of the upper section D is now moved to fit between the side bars 10 and 11 of the section C so that the bayonet slots 28 thereof engage the adjacent upper rung 13 of the section C, and the lower trunnions 31 fit within the bayonet slots 14 of section C, and upon the section D being moved downwardly relative to the section C, the bayonet slots cause the adjacent rungs to be interlocked therewith to rigidly secure the sections in position. The pivotal bar or member 26 thus provides an auxiliary locking means which coacts with the bayonet slots to insure the adjacent sections being firmly maintained in position.

The length of the extension ladder may be adjusted to lengthen or shorten the same by adding one or more sections to the base section or it may be shortened by removing one or more of the upper sections. The assembled sections now assume the position shown in Figure 4, and may be placed against a wall or the like E to provide an extension ladder of any desired length.

Thus it will be seen that the separate sections are constructed and arranged so that they may be conveniently set up end-to-end to form a rigid and durable extension ladder at a minimum expenditure of time and effort and in which the bayonet slots coact with adjacent rungs to securely and removably interlock the adjacent sections together. The bayonet slot joints are positioned on the overlapping portions of the sections and are detachably connected to the adjacent rungs on either the outside or inside of the side bars in such a manner that the weight or pressure applied to the front or outside of the extension ladder causes this weight to be transferred and carried directly by the rungs without danger of a breaking action or the sagging of the ladder. This novel and positive interlocking connection is clearly shown in Figure 5 in which it will be observed that the pressure or weight applied to the front of the ladder is transferred by the notched portions or shoulders of the bayonet slots directly to the spaced rungs 13 and 23', thus insuring the overlapped portions being firmly locked together and retained in this locked position until the rungs are moved out of contact with the shoulders. Further, the co-action of the bayonet slots with the rungs provides a simple and highly efficient ladder structure which is composed of a minimum number of parts and may be inexpensively made without sacrificing strength and rigidity. The ladder is preferably made of wood and dispenses with the use of removable rungs which not infrequently are difficult to manipulate, and eliminates expensive and heavy metallic parts such as independently movable locking elements. The bayonet slots in the end portions of the overlapped sections provide spaced means which are locked in engagement with the rungs on adjacent sections both inside and outside of the side bars 10 and 11 and operate so that the greater the pressure applied to the overlapped portions, the stronger and more rigid will the locking means act to secure the sections together. This is a very desirable and essential

feature since once the extension ladder has been properly assembled it may be safely used without danger of the sections accidentally being disconnected. In fact, the strongest parts of the ladder are now at the overlapped portions which are rigidly and firmly connected by the spaced interlocking engagement of the slots with their adjacent rungs, and this connection cannot be released until the rungs are removed from the slots.

When it is desired to dismantle the extension ladder, this may be easily done by sliding the rungs of each section out of engagement with the shoulder portions of the bayonet slots so that the sections may be removed and arranged in a compact pile for further use or for transportation purposes.

If it is desired to form one or two small step-ladders, then the section A is combined with the section B so that the lower rung 35 now constitutes the upper rung (Figure 2) and may receive either the bayonet slots 14 or the slots 21 in the section B so as to be pivotally connected thereto. The bar 18 is then swung about its pivot, so that its slot 20 will engage the adjacent rung in section B to maintain the sections or legs A and B in proper spaced position. The rung 29 of the section D may likewise be moved into pivotal engagement with the bayonet slots 14 in the section C and the bar 32 swung about its pivot so that the notch 34 thereof engages the adjacent rung on the section C to maintain the sections C and D properly spaced from each other.

The separate sections may further be converted to a large step-ladder by connecting the sections A and D together and the sections B and C to form the legs of the ladder, and then connecting the bayonet slots 14 in the upper end of the section C to the projecting trunnions 31 on the top rung of the section D. The legs of the ladder are maintained in proper spaced position by the slot 34 in the pivotal member 32, being moved into engagement with the adjacent rung 13 on the section C. The rungs may be secured to the side bars by any suitable means such as the nails 36 (Figure 1) and reinforcing nails 37 may be provided to strengthen the end portions of the side bars.

It will be understood that the forms of the invention shown and described are merely illustrative of preferred embodiments and that such changes may be made as fall within the purview of one skilled in the art and the scope of the claims.

I claim:

1. A ladder comprising separate sections having side bars and connecting rungs, said sections arranged to be connected end-to-end to form an extension ladder, the adjacent sections of the ladder being of different widths so that the end portions of the wide section overlap the end portions of the narrow section when the extension ladder is assembled, and the overlapped portions of the side bars of each section having bayonet slots adapted to receive and be moved into locking engagement with a rung of the adjacent section to rigidly and securely connect the sections of the ladder together.

2. A ladder comprising separate sections having side bars and connecting rungs, said sections arranged to be connected end-to-end to form an extension ladder, the adjacent sections of the ladder being of different widths so that the end portions of the wide section overlap the end portions of the narrow section when the

extension ladder is assembled, the overlapped portions of the side bars of each section having bayonet slots adapted to receive and be moved into locking engagement with a rung of the adjacent section to rigidly and securely connect the sections of the ladder together, and the end rung of the overlapped narrow section extending beyond the side bars to provide trunnions for receiving the bayonet slots in the adjacent wide section so that the adjacent sections are rigidly connected by spaced means disposed on the inside and outside of the side bars.

3. A ladder comprising separate sections having side bars and connecting rungs, said sections arranged to be connected end-to-end to provide an extension ladder, alternate sections of the ladder being substantially of the same width and wider than the remaining sections to provide wide and narrow sections having overlapped end portions when the extension ladder is assembled, the end rungs of the narrow sections extending outwardly from the side bars, the side bars of each section adjacent each end thereof having bayonet slots adapted to receive and be moved into locking engagement with rungs on the adjacent sections to secure the sections of the ladder together, and auxiliary locking means pivotally connected to a rung of one section and arranged to engage the rung of an adjacent section.

4. A ladder comprising separate sections having side bars and connecting rungs, said sections arranged to be connected end-to-end to provide an extension ladder, alternate sections of the ladder being substantially of the same width and wider than the remaining sections to provide wide and narrow sections having overlapped end portions when the extension ladder is assembled, the end rungs of the narrower sections extending outwardly from the side bars, the side bars adjacent the ends thereof having bayonet slots adapted to receive and be moved into locking engagement with adjacent rungs to secure the sections of the ladder together, the upper end rung of one of the wide sections arranged to

receive the bayonet slots in one end of one of the narrow sections to provide a pair of pivotally connected sections having legs diverging from the point of connection, and means connected to one of the legs and arranged to engage the other leg for maintaining the legs in spaced position.

5. A ladder comprising four separate sections formed of side bars and connecting rungs, said sections arranged to be connected end-to-end to provide an extension ladder, alternate sections of the ladder being substantially the same width and wider than the remaining sections to provide a pair of wide sections and a pair of narrow sections, each section having their end portions overlapping the adjacent end portions of the contiguous sections when the extension ladder is assembled, the overlapped portions of the side bars adjacent the ends thereof having bayonet slots adapted to receive and be moved into locking engagement with adjacent rungs to secure the sections of the extension ladder together, one of the wide sections constituting the base section of the ladder and one of the narrow sections the top section, the two narrow sections each having its end rungs extending outwardly from the side bars to receive the bayonet slots in the adjacent sections, the upper end portion of the base section arranged to overlap the lower end portion of the top section and be connected thereto by the bayonet slots engaging the rungs in the adjacent sections, the upper end portion of the other narrow section adapted to be overlapped by the lower end portion of the other wide section and connected thereto by the bayonet slots engaging the adjacent rungs, the bayonet slots in the upper end of the side bars of the last-mentioned section arranged to receive the trunnions on the upper rung of said top section to provide a pivotal connection therewith, and a member pivoted to the rung of said top section and arranged to engage a rung of the adjacent section to maintain the pivoted connected sections in spaced position.

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