May 11, 1943. M. C. HOLMES 2,318,943

LADDER

Filed May 17, 1940 2 Sheets-Sheet 1

Fig. 1.

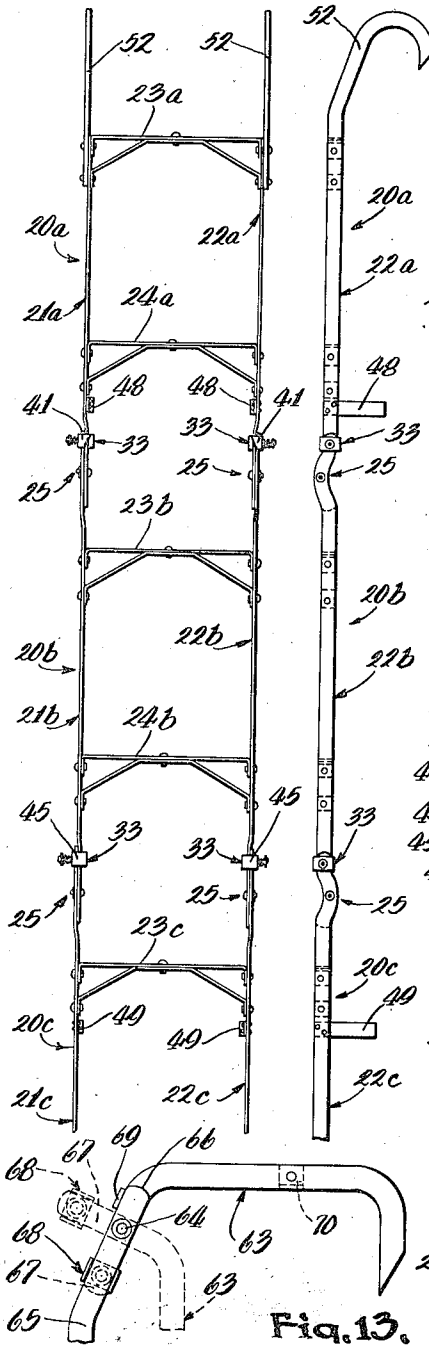


Fig. 13.

Fig. 2.

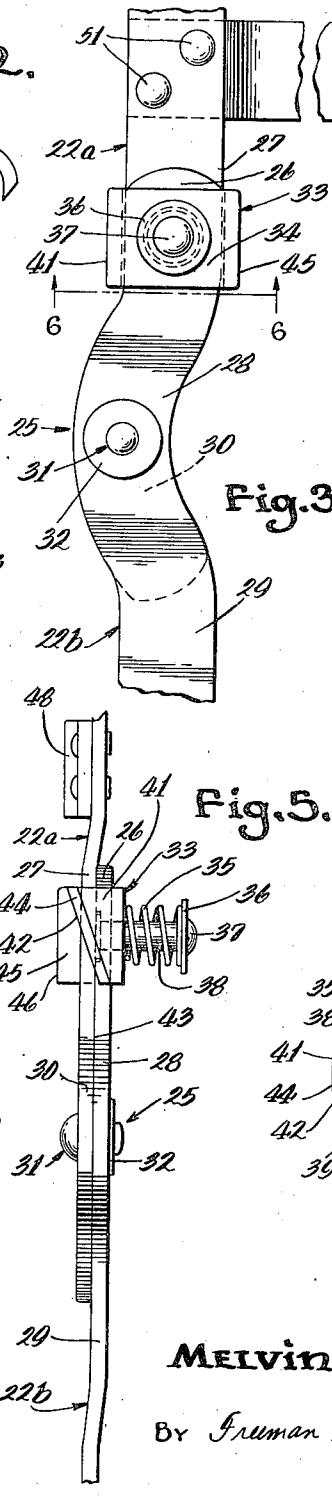


Fig. 3.

Fig. 5.

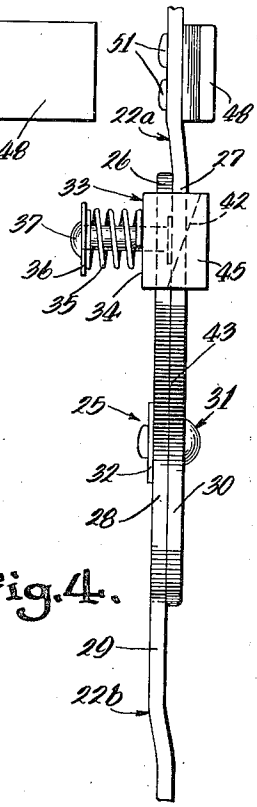


Fig. 4.

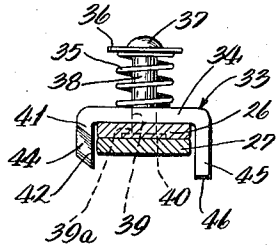


Fig. 6.

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LADDER

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Fig. 7.

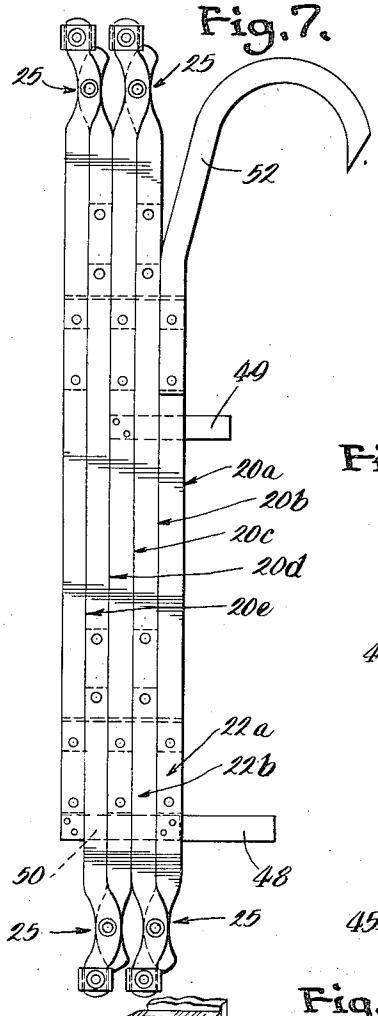


Fig. 8.

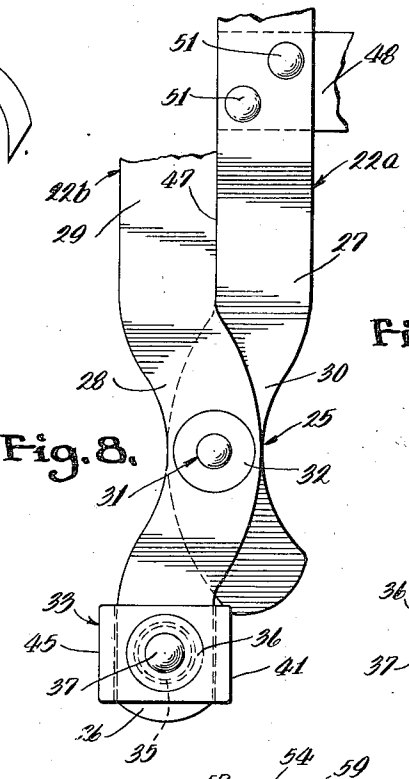


Fig. 9.

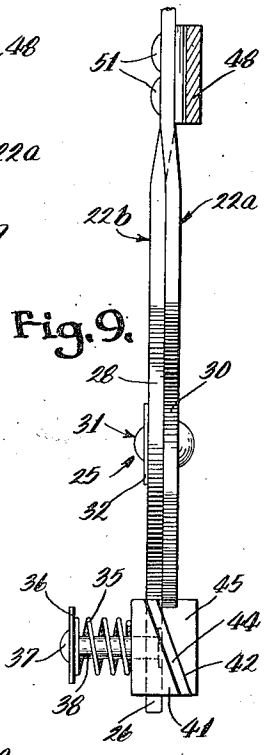


Fig. 11.

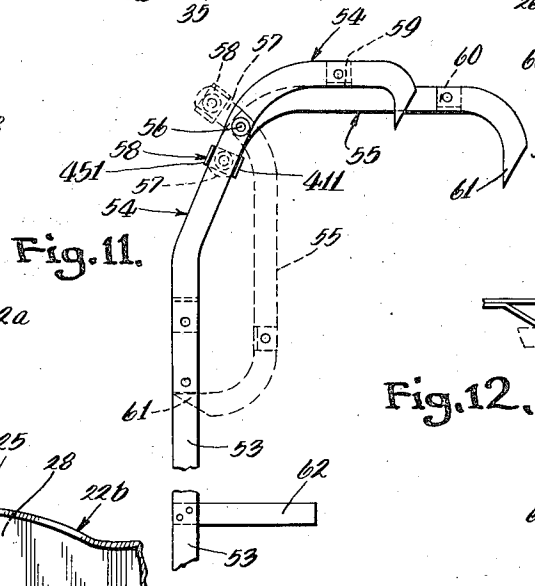


Fig. 12.

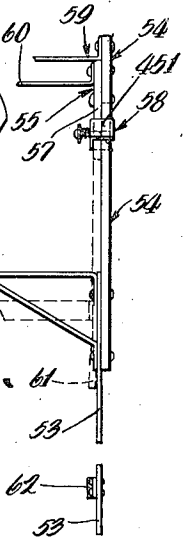
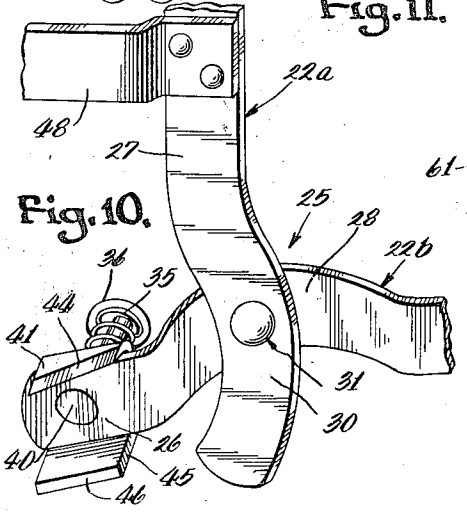


Fig. 10.



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UNITED STATES PATENT OFFICE

2,318,943

LADDER

Melvin C. Holmes, Cleveland, Ohio

Application May 17, 1940, Serial No. 335,853

20 Claims. (Cl. 228—44)

This invention relates to ladders of the sectional foldable and extensible type, and more particularly to fire escapes of this type, and the principal object of the invention is to provide improved ladders and fire escapes of these types.

In the drawings accompanying this specification, I have shown, for purposes of illustration, several fire escapes embodying the invention, and in these drawings:

Figure 1 is a fragmentary front elevation of a fire escape embodying the invention;

Figure 2 is a side elevation of the fire escape shown in Figure 1;

Figure 3 is a fragmentary side elevation, on an enlarged scale, of a locked pivoted joint between corresponding side pieces of adjacent sections, as used in the fire escape shown in Figures 1 and 2;

Figure 4 is an elevation looking toward the right side of the parts shown in Figure 3;

Figure 5 is an elevation, looking toward the left side of the parts shown in Figure 3;

Figure 6 is a section taken along the line 6—6 of Figure 3;

Figure 7 is a side elevation of a fire escape such as shown in Figure 1, folded;

Figure 8 is a fragmentary view, similar to Figure 3, but with the joint unlocked and the side pieces in folded position;

Figure 9 is an elevation looking toward the right side of the part shown in Figure 8;

Figure 10 is a fragmentary perspective view of a joint such as shown in Figures 3, 4, 5, 8, and 9, with the parts in a position intermediate fully folded and fully unfolded, locked position;

Figure 11 is a fragmentary side elevation of the upper portion of another embodiment of the fire escape;

Figure 12 is a fragmentary front elevation of the fire escape shown in Figure 11; and

Figure 13 is a fragmentary side elevation of a detail of another embodiment.

The fire escape herein illustrated comprises a plurality of ladder sections 20*a*, 20*b*, 20*c*, 20*d*, and 20*e* all of which appear in Figure 7 whereas only the sections 20*a*, 20*b* and part of the section 20*c* are shown in Figures 1 and 2. The number of sections may be any other desired and suitable number. Each section comprises metal side pieces 21, 22 these reference numerals being provided with letter suffixes corresponding to the letter suffixes of the section-designating numeral 20, that is, the side pieces 21*a*, 22*a* constitute part of section 20*a*, the side pieces 21*b*, 22*b* constitute part of section 20*b*, and so on. Each ladder section desirably includes two suitably braced rungs 23*a*, 24*a*, etc., constructed of metal, riveted or otherwise suitably fastened to the respective side pieces. The side pieces, rungs, and other portions of the fire escape are here shown as made from flat strip metal, but any other suitable shape may be used.

The section 20*a* is pivotally connected to the section 20*b* by joints 25, joining corresponding side pieces. Referring now more particularly to Figures 3, 4, and 5, the joint 25 between the side pieces 22*a* and 22*b* is there shown enlarged, the parts being in locked position as in Figures 1 and 2, as will more fully appear. As can be seen in Figures 2 and 3 the principal portions of the side pieces 22*a* and 22*b* are straight in side elevation and have their general longitudinal axes in alignment. The side piece 22*b* has a straight end portion 26 overlapping and in registry with a straight portion 27 of the side piece 22*a*. The straight end portion 26 merges with an arcuate offset portion 28 which in turn merges with the principal straight portion 29 of the side piece 22*b*. The straight portion 27 of the side piece 22*a* continues downwardly, as viewed in Figure 3, until it merges with an arcuate offset portion 30 similar to and underneath the arcuate portion 28, as viewed in Figure 3. As here shown the arcuate portion 30 extends to substantially the straight portion 29.

The overlapping, registering arcuate portions 28, 30 are provided intermediate their ends with registering apertures through which is disposed the shank of a pivot pin 31, the shank being peened over a washer 32.

In the position of the parts shown in Figures 3, 4 and 5, the side pieces 22*a*, 22*b* are locked against relative rotation about the pivot pin 31 by a U-shaped member 33 which embraces the overlapping portions 26, 27 of the side pieces 22*b*, 22*a*. The U-shaped member 33 is shown as of generally rectangular form having a flat bight 34 the inside of which is biased against the portion 26 by means of a helical spring 35 one end of which bears against the outside of the bight 34 and the other end of which bears against a washer 36 in turn held by a peened over end 37 of a pin 38. The pin 38 is disposed slightly loose in and through registering apertures 39, 39*a* in the bight 34 and in the portion 26 respectively, and the pin 38 is provided with a head 40 countersunk flush with the surface

of the portion 26 so that the portions 26 and 27 may be in flat engagement.

It will be evident that the legs 41, 45 of the U-shaped member 33 constitute stop members, flat surfaces of which transversely overlap opposite margins of the overlapping portions 26, 27. Thus relative rotative movement of the portions 26, 27, and hence of the side pieces 22a, 22b, about the pivot pin 31, is prevented.

The locking means comprising the U-shaped member 33 is so constructed and arranged that relative movement of adjacent sections from folded into unfolded position automatically causes the U-shaped member to assume the locking position shown in Figures 1 through 6, as will more fully appear. To this end the U-shaped member 33 is here shown as having one of its legs, 41, provide a cam, the leg being so formed that the free marginal end 42 of the leg 41 (as seen in Figure 5) extends from approximately the general plane of engagement 43 of the overlapping portions 26, 27, diagonally across the portion 27. The outside marginal portion of the free end of the leg 41 is desirably beveled so as to provide a bevel surface 44. The other leg, 45, of the U-shaped member 33 may have its free end 46 formed at right angles to the side margins of the leg 45. The length of the leg 45 is desirably greater than the greatest length of the leg 41.

Referring now to Figures 8 and 9, these figures correspond respectively to Figures 3 and 4 but show the parts in the position they assume when the side pieces 22a and 22b are in fully folded position. It will be noted that the pivot pin 31 is so positioned that its axis is in the plane 47 defining the adjacent side margins of the side pieces 22a, 22b.

Referring to Figure 2, it will be noted that while all of the joints 25 are similar, the joint 25 between the sections 20a and 20b is offset toward the left as viewed in Figure 2, whereas the joint 25 between the sections 20b and 20c is offset toward the right, and, in general, succeeding joints are offset in successively opposite directions, so that the fire escape may be folded with all of the side pieces in sidewise engagement. Figure 7 shows the entire fire escape in fully folded position. It will be noted by reference to Figures 1, 2, and 7 that since successive pairs of adjacent sections are folded oppositely, the locking means for the joints between successive sections are alternately reversely arranged, for example, the locking means for the joint between the sections 20a, 20b is so arranged that the cam legs 41 are nearest an observer viewing Figure 1, whereas in the locking means for the joint between sections 20b, 20c, the U-shaped member 33 is reversed, so that the cam legs 41 are furthest from the observer, and so on.

If desired, the overlapping portions 28, 30 of the side pieces may be offset, from the side pieces of which they respectively are parts, in opposite directions transversely of the general plane of the principal portions of the side pieces, as may be seen in Figures 1, 4, 5, and 9, whereby the plane of engagement of the overlapping portions 28, 30 coincides with the median plane of the principal portions of the side pieces.

The sections of the fire escape may be provided with struts 48, 49, 50 adapted to engage the side wall of a building, and as here shown, alternate sections beginning with the section 20a are provided with struts. The struts 48, 49, 50 may be fastened to the side pieces of the respective sections by rivets 51 or in any other suitable way, and are desirably offset inwardly away from the planes of the respective side pieces so that they will readily nest with respect to the other parts when the fire escape is in folded position as shown in Figure 7.

The topmost section, 20a, of the fire escape includes hook members 52 here shown as separate members, fastened in any suitable way to the side pieces 21a, 22a. The hook members 52 are of any desirable and suitable form so that the pointed ends of the hooks may be driven into a window sill, or otherwise engage, or span the sill structure.

The operation of the fire escape is as follows. Assuming that the fire escape is in fully folded position as shown in Figure 7 and that the section 20a, for example, is pulled away from the remainder of the sections, the adjacent sections 20a, 20b will be caused to rotate relatively the pivot pins 31 of the joints 25 joining these sections, so that (considering one pair of jointed side pieces by way of example, and referring to Figure 8) the side piece 22b will be rotated, relatively to the side piece 22a, in a counter clockwise direction. Continued relative rotation of the side pieces will bring the diagonal beveled margin 32, 44 of the leg 41 into engagement with the right hand margin of the portion 27, as viewed in Figure 8, further relative rotation causing the leg 41 to be cammed laterally away from the portion 27, against the bias of the spring 35, the U-shaped member being tilted somewhat. Eventually the point of the margin 42 rides across the lateral face of the portion 27 and when the inside surface of the leg 41 reaches the left hand margin of the portion 27, as viewed in Figure 8, the leg 41 will snap into the position shown in Figures 1 through 6, in which further relative rotation of the side pieces is prevented by the leg 45. Relative rotation of the side pieces 22a, 22b in the reverse direction is of course prevented by the flat inside surface of the leg 41. The other sections of the fire escape may be unfolded in like manner, so that the entire fire escape will assume the unfolded, extended position shown in Figures 1 and 2, in which the sections are rigidly locked together, whereby the fire escape may be easily raised and the hooks 52 brought into engagement with a window sill.

The fire escape may also be readily extended by oppositely directed pull on the end sections. It is of course obvious that the fire escape may also be unfolded from within a window.

The fire escape, after having been extended, can be folded only if the U-shaped members 33 are pressed against the bias of the springs 35 far enough to permit the portions 27 to be freed for rotation relatively to the portions 26.

Referring now to Figures 11 and 12, there is here shown the upper portion of a fire escape provided with hook means for engaging a portion of a building, the hook means comprising a plurality of pair of hooks, each pair of a different size, the construction being such that selected one of the pairs of hooks may be utilized. The side piece 53 of the fragment of the section shown has suitably fastened thereto a relatively small hook 54, it being understood that the other side piece (not shown) of the section has a similar hook fastened thereto. An extension hook 55 is pivoted by means of a pivot pin 56 to the neck portion of the hook 54. The extension hook 55 has a portion 57 registering with the neck portion of the smaller hook 54 when the parts are in the position shown

in full lines in Figures 11 and 12, and this portion 57 is provided with locking means 58 similar to the locking means 33 shown in Figures 1 through 10. The upper surface of the extension hook 55 is adapted to bear against stop means 59 provided on the small hook 54 which stop means may be in the form of a brace suitably fastened to and extending from one hook 54 to the other of that pair. The stop means 59 may be provided, if desired, either to secure greater strength if necessary or for a purpose which will appear. If desired, a brace 60 suitably fastened to and extending from one extension hook 55 to the other of that pair may be provided.

Struts 62, similar to the struts 48, of suitable length are fastened to the side pieces of the desired sections.

When the fire escape provided with hook means such as shown in Figures 11 and 12 is in a fully folded position corresponding to Figure 7, the extension hook 55 will normally be in the dotted line position shown in Figures 11 and 12. In this position the points 61 of each extension hook 55 are adapted respectively to frictionally engage the inside surface of the respective side pieces 53. The resilience of the side pieces 53 will serve to permit the extension hook 55 to assume the dotted line position and releasably hold it in that position. Accordingly, the fire escape is normally ready for use with the small hook 54. On the other hand, if it is desired to use the extension hook 55, this hook may be readily swung out and automatically locked, by the means 58, in the full line position shown in Figures 11 and 12. The extension hook 55 is desirably designed to span the entire sill structure at the base of a window, whereas the small hook may be designed to engage the sill portion outside of an open or closed window.

As shown in Figures 11 and 12 the locking means 58 has legs 411 and 451 corresponding respectively to the legs 41 and 45 in Figures 1 through 10, but it will be evident that since the stop means 59 prevents counter-clockwise rotation of the hook 55 in the full line position of the parts shown in Figures 11 and 12, the leg 451 may, if desired, be omitted if the stop means 59 is provided, so that the stop means 59 and the leg 411 together comprise the locking means.

Referring to Figure 13, there is here shown another embodiment of hook means comprising a relatively long hook 63 pivoted at 64 to a portion of the uppermost section of the ladder, the portion being in this instance a member 65 corresponding to the neck portion of the hook 54 of Figures 11 and 12, it being understood that the portion 65 is fastened to or integral with a side piece of the ladder as in the previously described embodiments. The member 65 is, however, not formed as a hook but has its upper end 66 terminating any desired distance from the pivot 64.

The hook 63 has a portion 67 extending from the pivot 64 in the opposite direction from the hook proper, and the portion 67 may be provided with a locking means 68 similar to the locking means 33 shown in Figures 1 through 10, which locking means cooperates with the portion 65 when the parts are in the full line position of the hook 63. In that position the hook 63 abuts suitable stop means 69 which may be provided on the portion 65 if desired. The stop means 69 may be a lug extending into the path of the hook 63 and this lug thus corresponds in function to the stop means 59 of Figures 11 and 12.

When the hook 63 is in folded position it assumes the position shown in dotted lines in Figure 13, the construction and arrangement being desirably such that the hook, in that position, does not extend laterally beyond struts (not shown) similar to the struts 48, 49, 50 of the embodiment of Figures 1 through 10.

It will be understood that the side of the fire escape to the rear of the part visible in Figure 13 is identical with the side visible in Figure 13 thus providing another hook like the hook 63. The hooks may have extending between them and fastened thereto a brace 70.

Hook means of the form shown in Figure 13 is suitable when it is desired to provide a single, long hook adapted to span the entire sill structure at the base of a window, and at the same time permit reducing to a minimum the space occupied by the parts when the fire escape is not in use.

It will of course be evident that a construction may be provided which omits the hooks and struts hereinbefore described which particularly adapt the sectional ladder for use as a fire escape. The sectional ladder may then be used as an ordinary ladder.

From the foregoing it will be apparent to those skilled in the art that each of the illustrated embodiments of my invention provides a new and improved ladder, and accordingly, each accomplishes the principal object of my invention. On the other hand, it also will be obvious to those skilled in the art that the illustrated embodiments of my invention may be variously changed and modified, or features thereof, singly or collectively, embodied in other combinations than those illustrated, without departing from the spirit of my invention, or sacrificing all of the advantages thereof, and that accordingly, the disclosure herein is illustrative only, and my invention is not limited thereto.

I claim:

1. Ladder means comprising side pieces and rungs, said ladder means comprising a plurality of pivotallly joined sections, corresponding side pieces of adjacent sections having principal straight portions in longitudinal alignment when said adjacent sections are extended; joint means between said principal portions off-set from said principal portions in the general plane thereof, said joint means comprising off-set overlapping portions forming parts of said corresponding side pieces respectively, the off-set portion of each side piece extending approximately to the straight portion of the other side piece, and a pivot disposed through said off-set portions approximately mid-way between their ends; one of said off-set portions having a straight extension at its end overlapping and substantially registering with a straight portion of the other of said side pieces; and means, cooperating with said extension and said registering straight portion, constructed and arranged to lock said side pieces against relative rotation about said pivot.

2. Ladder means comprising side pieces and rungs, said ladder means comprising a plurality of sections; pivot means so joining corresponding side pieces of adjacent sections that a section may be swung with respect to the adjacent section from a position in which said sections are folded to a position in which said sections are unfolded and in which portions of corresponding side pieces are in alignment and overlap each other; and locking means for holding adjacent sections in said unfolded position comprising stop members which in locking position transversely

overlap opposite margins of said overlapping portions, said locking means being so constructed and arranged that relative movement of said adjacent sections into said unfolded position automatically causes said stop members to assume said locking position.

3. Ladder means comprising side pieces and rungs, said ladder means comprising a plurality of sections; pivot means so joining corresponding side pieces of adjacent sections that a section may be swung with respect to the adjacent section from a position in which said sections are folded to a position in which said sections are unfolded and in which portions of corresponding side pieces are in alignment and overlap each other; and locking means for holding adjacent sections in said unfolded position comprising stop members in a position transversely overlapping opposite margins of said overlapping portions when aligned, one of said stop members having a cam surface adapted to engage a margin of one of said overlapping portions, said locking means being so constructed and arranged that relative movement of said adjacent sections into said unfolded position automatically causes said stop members to assume said locking position.

4. Ladder means comprising side pieces and rungs, said ladder means comprising a plurality of sections; pivot means so joining corresponding side pieces of adjacent sections that a section may be swung with respect to the adjacent section from a position in which said sections are folded to a position in which said sections are unfolded and in which portions of corresponding side pieces are in alignment and overlap each other; and locking means for holding adjacent sections in said unfolded position comprising a generally U-shaped member adapted to embrace said overlapping portions when aligned, said locking means being so constructed and arranged that relative movement of said adjacent sections into said unfolded position automatically causes said U-shaped member to embrace said overlapping portions.

5. Ladder means comprising side pieces and rungs, said ladder means comprising a plurality of sections; pivot means so joining corresponding side pieces of adjacent sections that a section may be swung with respect to the adjacent section from a position in which said sections are folded to a position in which said sections are unfolded and in which portions of corresponding side pieces are in alignment and overlap each other; and locking means for holding adjacent sections in said unfolded position comprising a member carried by and extending transversely of a first of said overlapping portions at a first margin thereof and adapted to engage the corresponding margin of the second of said overlapping portions when aligned, said member having its free end formed so as to extend from approximately the general plane of engagement of said overlapping portions diagonally across said second of said portions and having the outer margin of said free end beveled, resilient means constructed and arranged to bias said member into the position in which said member is adapted to engage said second of said overlapping portions, and stop means, carried by said first portion at a second margin opposite said first margin, constructed and arranged to engage the corresponding margin of said second margin.

6. Ladder means comprising side pieces and rungs, said ladder means comprising a plurality of sections; pivot means so joining corresponding side pieces of adjacent sections that a section may be swung with respect to the adjacent section from a position in which said sections are folded to a position in which said sections are unfolded and in which portions of corresponding side pieces are in alignment and overlap each other; and locking means for holding adjacent sections in said unfolded position comprising a generally U-shaped member carried by one of said overlapping portions and adapted to embrace said overlapping portions when aligned, at least one of the legs of said member having its free end formed so as to extend from approximately the general plane of engagement of said overlapping portions diagonally across the other of said portions and having the outer margin of said free end beveled, stud means carried by said one of said portions and disposed through an aperture in the bight of said U-shaped member, and resilient means constructed and arranged to bias said bight against one of said portions.

7. Ladder means comprising side pieces and rungs, said ladder means comprising a plurality of pivotally joined sections, corresponding side pieces of adjacent sections having principal straight portions in longitudinal alignment when said adjacent sections are extended; joint means between said principal portions off-set from said principal portions in the general plane thereof, said joint means comprising off-set overlapping portions having outside margins and inside margins, said overlapping portions forming parts of said corresponding side pieces respectively; a pivot disposed through said overlapping portions, the axis of said pivot being approximately on a line defining corresponding aligned margins of said straight portions; said outside margins and said inside margins being respectively coextensive in at least one direction away from a plane including the axis of said pivot and transverse to said overlapping portions a distance in said direction at least as great as the width of said straight portions; one of said overlapping portions having a straight extension in said direction overlapping and substantially registering with a straight portion of the other of said side pieces; and means, cooperating with said extension and said registering straight portion, constructed and arranged to lock said side pieces against relative rotation about said pivot.

8. Ladder means comprising side pieces and rungs, said ladder means comprising a plurality of pivotally joined sections, corresponding side pieces of adjacent sections having principal straight portions in longitudinal alignment when said adjacent sections are extended; joint means between said principal portions off-set from said principal portions in the general plane thereof, said joint means comprising off-set overlapping portions of substantially the same width as and forming integral parts of said corresponding side pieces respectively; a pivot disposed through said overlapping portions, the axis of said pivot being approximately on a line defining corresponding aligned margins of said straight portions; at least one of said off-set portions extending from said pivot to the straight portion of the other side piece and having a straight extension at its end overlapping and substantially registering with a straight portion of the other side piece; and means, cooperating with said extension and said registering straight portion, constructed and arranged to lock said side pieces against rotation about said pivot.

9. Ladder means comprising side pieces and rungs, said ladder means comprising a plurality of pivotally joined sections, corresponding side pieces of adjacent sections having principal straight portions in longitudinal alignment when said adjacent sections are extended; joint means between said principal portions off-set from said principal portions in the general plane thereof, said joint means comprising off-set overlapping portions forming parts of said corresponding side pieces respectively; and a pivot disposed through said off-set portions, the axis of said pivot being approximately on a line defining corresponding aligned margins of said straight portions; the off-set portion of at least one side piece extending from said pivot to the straight portion of the other side piece and having a straight extension at its end overlapping and substantially registering with a straight portion of said other side piece; and locking means for holding adjacent sections in said extended position comprising stop members which in locking position transversely overlap opposite margins of said extension and said registering straight portion, said locking means being so constructed and arranged that relative movement of said adjacent sections into said extended position automatically causes said stop members to assume said locking position.

10. Ladder means comprising side pieces and rungs, said ladder means comprising a plurality of pivotally joined sections, corresponding side pieces of adjacent sections having principal straight portions in longitudinal alignment when said adjacent sections are extended; joint means between said principal portions off-set from said principal portions in the general plane thereof, said joint means comprising off-set overlapping joint portions having outside margins and inside margins, said overlapping joint portions forming parts of said corresponding side pieces respectively; a pivot disposed through said overlapping joint portions, the axis of said pivot being approximately on a line defining corresponding aligned margins of said straight portions; said outside margins and said inside margins being respectively coextensive in at least one direction, away from a plane including the axis of said pivot and transverse to said overlapping joint portions, a distance in said direction at least as great as the width of said straight portions, and the distance between the axis of said pivot and the junction between a joint portion and the straight portion of the side piece of which said joint portion is a part being at least as great as the width of said straight portions.

11. Ladder means comprising side pieces and rungs, said ladder means comprising a plurality of pivotally joined sections, corresponding side pieces of adjacent sections having principal straight portions in longitudinal alignment when said adjacent sections are extended; joint means between said principal portions off-set from said principal portions in the general plane thereof, said joint means comprising off-set overlapping joint portions having outside margins and inside margins, said overlapping joint portions forming parts of said corresponding side pieces respectively; a pivot disposed through said overlapping joint portions, the axis of said pivot being approximately on a line defining corresponding aligned margins of said straight portions; and said outside margins and said inside margins being respectively coextensive in at least one direction, away from a plane including the axis of said pivot and transverse to said overlapping joint portions, a distance in said direction at least as great as the width of said straight portions, said distance being approximately the distance in said direction between the axis of said pivot and the junction between a joint portion and the straight portion of the side piece of which said joint portion is a part.

12. Ladder means comprising side pieces and rungs, said ladder means comprising a plurality of pivotally joined sections, corresponding side pieces of adjacent sections having principal straight portions in longitudinal alignment when said adjacent sections are extended; joint means between said principal portions off-set from said principal portions in the general plane thereof, said joint means comprising off-set overlapping joint portions having outside margins and inside margins, said overlapping joint portions forming parts of said corresponding side pieces respectively; a pivot disposed through said overlapping joint portions, the axis of said pivot being approximately on a line defining corresponding aligned margins of said straight portions; said outside margins and said inside margins being respectively coextensive in at least one direction, away from a plane including the axis of said pivot and transverse to said overlapping joint portions, a distance in said direction materially greater than the width of said straight portions, and the distance between the axis of said pivot and the junction between a joint portion and the straight portion of the side piece of which said joint portion is a part being materially greater than the width of said straight portions.

13. Ladder means comprising side pieces and rungs, said ladder means comprising a plurality of pivotally joined sections, corresponding side pieces of adjacent sections having principal straight portions in longitudinal alignment when said adjacent sections are extended; joint means between said principal portions off-set from said principal portions in the general plane thereof, said joint means comprising off-set overlapping joint portions having outside margins and inside margins, said overlapping joint portions forming parts of said corresponding side pieces respectively; a pivot disposed through said overlapping joint portions, the axis of said pivot being approximately on a line defining corresponding aligned margins of said straight portions; and said outside margins and said inside margins being respectively coextensive in at least one direction, away from a plane including the axis of said pivot and transverse to said overlapping joint portions, a distance in said direction materially greater than the width of said straight portions, said distance being approximately the distance in said direction between the axis of said pivot and the junction between a joint portion and the straight portion of the side piece of which said joint portion is a part.

14. Ladder means comprising side pieces and rungs, said ladder means comprising a plurality of pivotally joined sections, corresponding side pieces of adjacent sections having principal straight portions in longitudinal alignment when said adjacent sections are extended; joint means between said principal portions off-set from said principal portions in the general plane thereof, said joint means comprising off-set overlapping joint portions having outside margins and inside margins, said overlapping joint portions forming parts of said corresponding side pieces respectively; a pivot disposed through said over-

lapping joint portions, the axis of said pivot being approximately on a line defining corresponding aligned margins of said straight portions; said outside margins and said inside margins being respectively coextensive in at least one direction away from a plane including the axis of said pivot and transverse to said overlapping joint portions a distance in said direction at least as great as the width of said straight portions; one of said joint portions having a straight extension in said direction overlapping and substantially registering with a straight portion of the other of said side pieces.

15. Ladder means comprising side pieces and rungs, said ladder means comprising a plurality of pivotally joined sections, corresponding side pieces of adjacent sections having principal straight portions in longitudinal alignment when said adjacent sections are extended; joint means between said principal portions off-set from said principal portions in the general plane thereof, said joint means comprising off-set overlapping portions having outside margins and inside margins, said overlapping portions forming parts of said corresponding side pieces respectively; a pivot disposed through said overlapping portions, the axis of said pivot being approximately on a line defining corresponding aligned margins of said straight portions; said outside margins and said inside margins being respectively coextensive in opposite directions, away from a plane including the axis of said pivot and transverse to said overlapping portions, a distance in said directions at least as great as the width of said straight portions; and one of said joint portions having a straight extension in one of said directions overlapping and substantially registering with a straight portion of the other of said side pieces.

16. Ladder means comprising side pieces and rungs, said ladder means comprising a plurality of pivotally joined sections, corresponding side pieces of adjacent sections having principal straight portions in longitudinal alignment when said adjacent sections are extended; and joint means between said principal portions off-set from said principal portions in the general plane thereof, said joint means comprising similar off-set overlapping joint portions of substantially the same width as and forming integral parts of said corresponding side pieces, said joint portions having outer convex margins and inner concave margins, the joint portion of each side piece extending from the straight portion of the side piece of which it is a part approximately at least to the junction between the other joint portion and the straight portion of the side piece of which said other joint portion is a part, and a pivot disposed through said overlapping joint portions the axis of said pivot being approximately on a line defining corresponding aligned margins of said straight portions.

17. Ladder means comprising side pieces and rungs, said ladder means comprising a plurality of pivotally joined sections, corresponding side pieces of adjacent sections having principal straight portions in longitudinal alignment when said adjacent sections are extended; and joint means between said principal portions off-set from said principal portions in the general plane thereof, said joint means comprising similar off-set overlapping joint portions of substantially the same width as and forming integral parts of said corresponding side pieces, said joint portions having outer convex margins and inner concave margins, the joint portion of each side piece extending from the straight portion of the side piece of which it is a part approximately at least to the junction between the other joint portion and the straight portion of the side piece of which said other joint portion is a part, one of said joint portions having a straight extension overlapping the straight portion of the other side piece, and a pivot disposed through said overlapping joint portions the axis of said pivot being approximately on a line defining corresponding aligned margins of said straight portions.

18. Ladder means comprising side pieces and rungs, said ladder means comprising a plurality of pivotally joined sections, corresponding side pieces of adjacent sections having principal straight portions in longitudinal alignment when said adjacent sections are extended; joint means between said principal portions off-set from said principal portions in the general plane thereof, said joint means comprising off-set overlapping portions having outside margins and inside margins, said overlapping portions forming parts of said corresponding side pieces respectively; a pivot disposed through said overlapping portions, the axis of said pivot being approximately on a line defining corresponding aligned margins of said straight portions; said outside margins and said inside margins being respectively coextensive in opposite directions, away from a plane including the axis of said pivot and transverse to said overlapping portions, a distance in said directions at least as great as the width of said straight portions; one of said joint portions having a straight extension in one of said directions overlapping and substantially registering with the straight portion of the other of said side pieces; and means, cooperating with said extension and said registering straight portion, constructed and arranged to lock said side pieces against relative rotation about said pivot.

19. Ladder means comprising side pieces and rungs, said ladder means comprising a plurality of pivotally joined sections, corresponding side pieces of adjacent sections having principal straight portions in longitudinal alignment when said adjacent sections are extended; joint means between said principal portions off-set from said principal portions in the general plane thereof, said joint means comprising off-set overlapping portions forming parts of said corresponding side pieces respectively; and a pivot disposed through said off-set portions, the axis of said pivot being approximately on a line defining corresponding aligned margins of said straight portions; the off-set portion of one of said side pieces extending from said pivot approximately to the straight portion of the other side piece, and the off-set portion of the other side piece extending to the straight portion of said one side piece and having a straight extension at its end overlapping and substantially registering with the straight portion of said one side piece; and means, cooperating with said extension and said registering straight portion, constructed and arranged to lock said side pieces against rotation about said pivot.

20. Ladder means comprising side pieces and rungs, said ladder means comprising a plurality of pivotally joined sections, corresponding side pieces of adjacent sections having principal straight portions in longitudinal alignment when said adjacent sections are extended; joint means between said principal portions off-set from said principal portions in the general plane thereof,

said joint means comprising off-set overlapping portions forming parts of said corresponding side pieces respectively; and a pivot disposed through said off-set portions, the axis of said pivot being approximately on a line defining corresponding aligned margins of said straight portions; the off-set portion of one of said side pieces extending from said pivot approximately to the straight portion of the other side piece, and the off-set portion of the other side piece extending to the straight portion of said one side piece and having a straight extension at its end overlapping and substantially registering with the straight portion of said one side piece; and locking means for holding adjacent sections in said extended position comprising stop members which in locking position transversely overlap opposite margins of said extension and said registering straight portion, said locking means being so constructed and arranged that relative movement of said adjacent sections into said extended position automatically causes said stop members to assume said locking position.

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