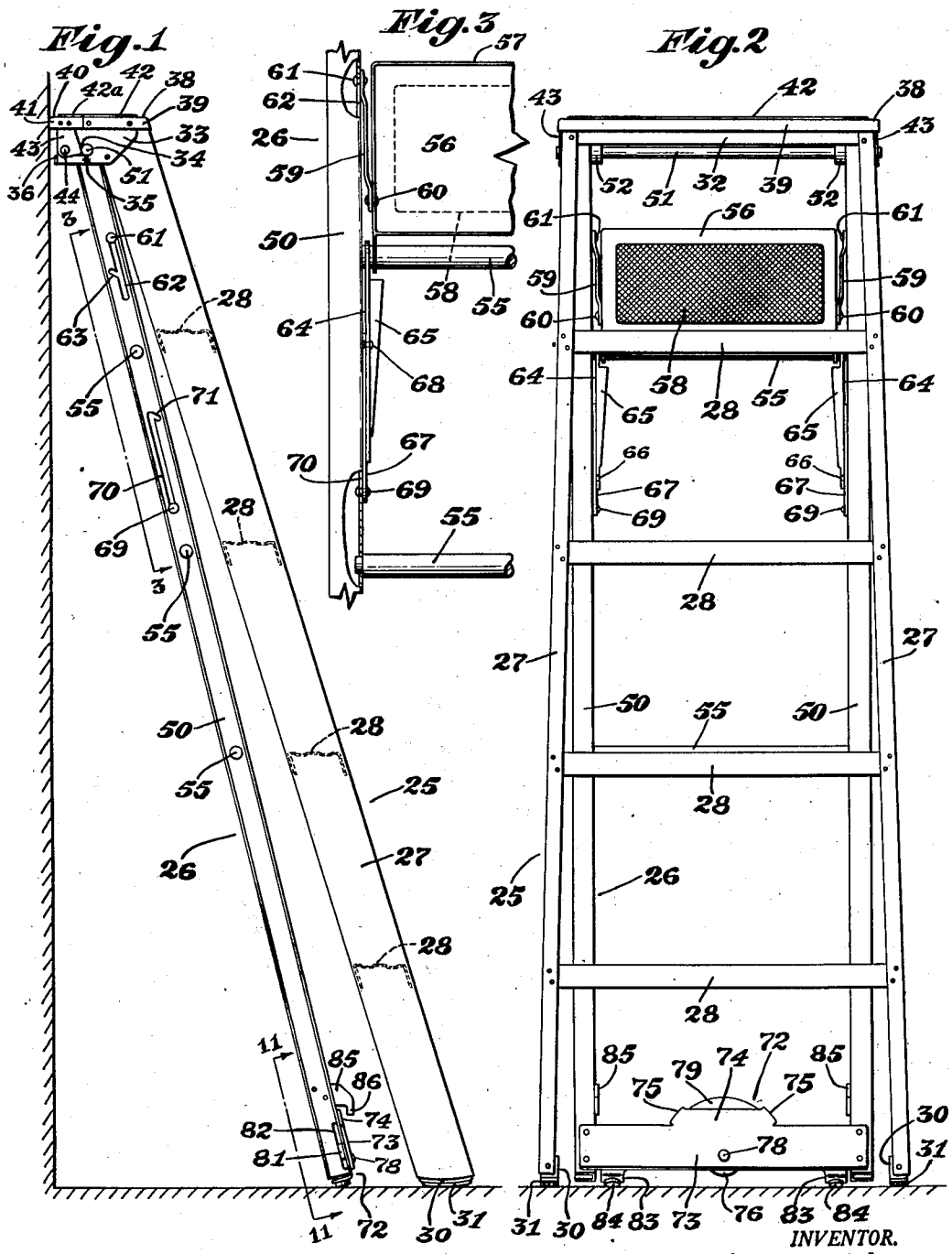
May 26, 1953 R. E. PIERCE 2,639,853

LADDER STRUCTURE

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LADDER STRUCTURE

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Fig. 4

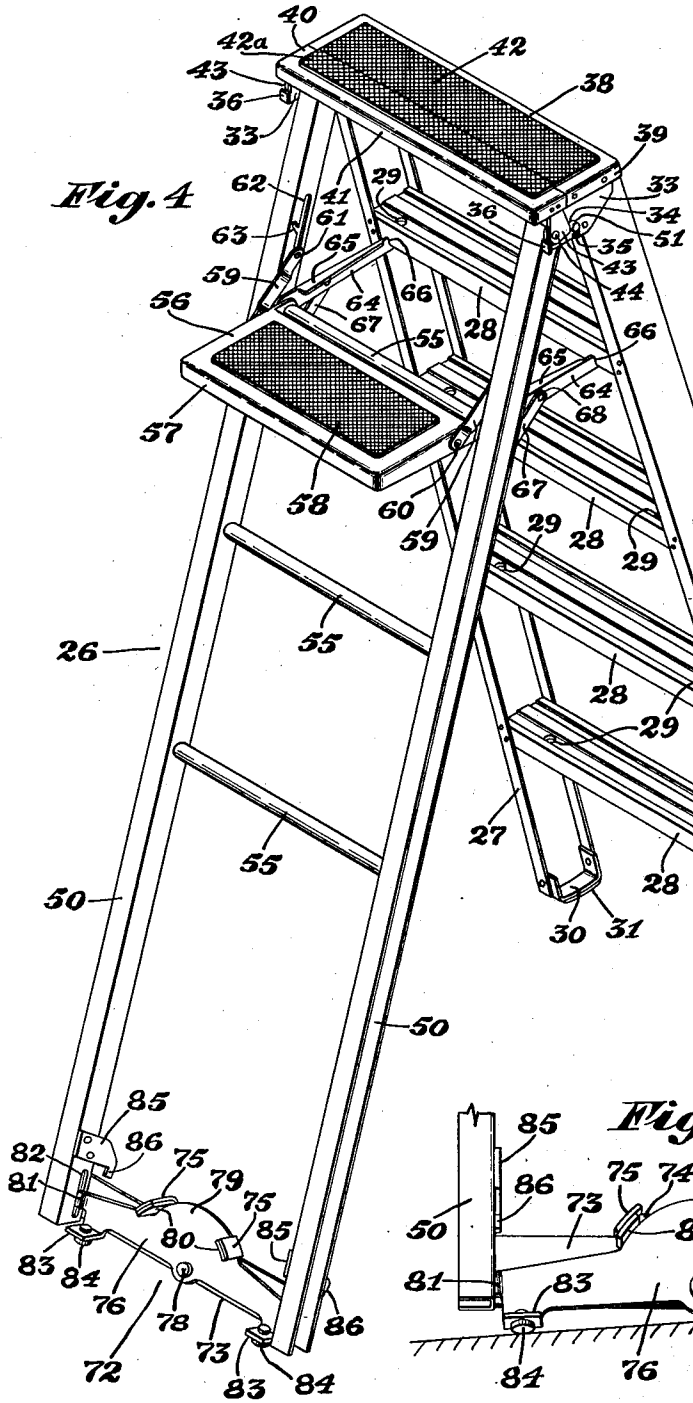


Fig. 15

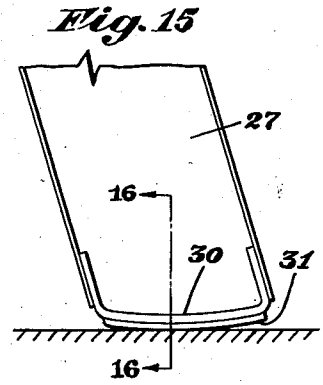


Fig. 16

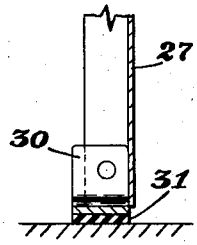
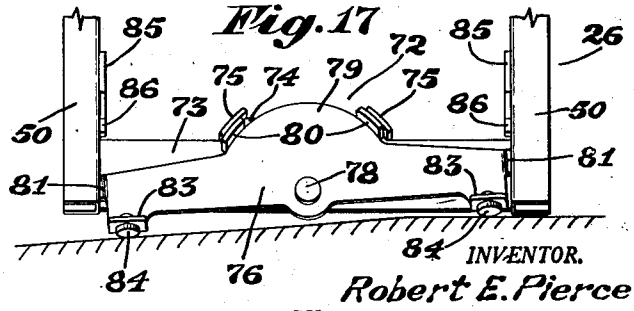


Fig. 17

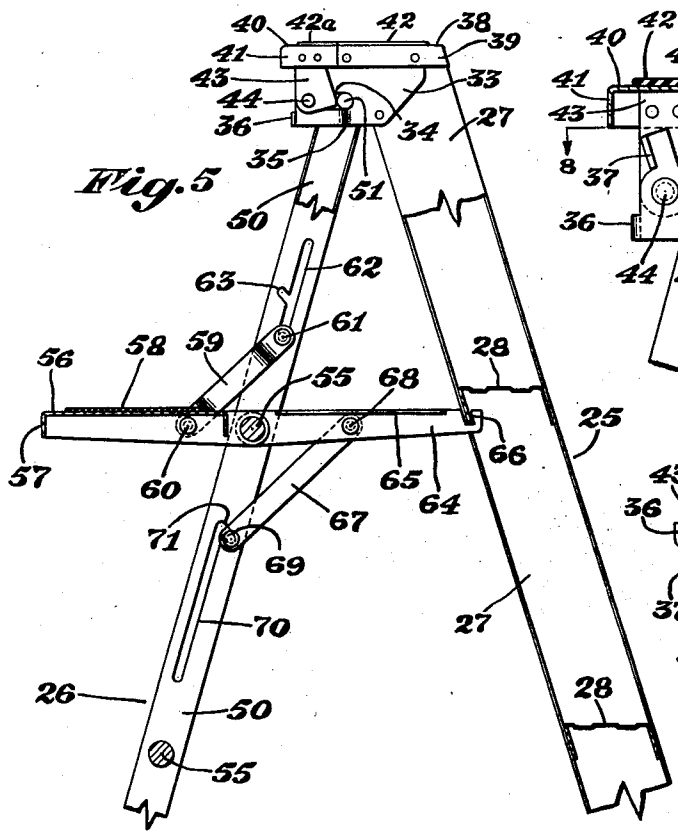


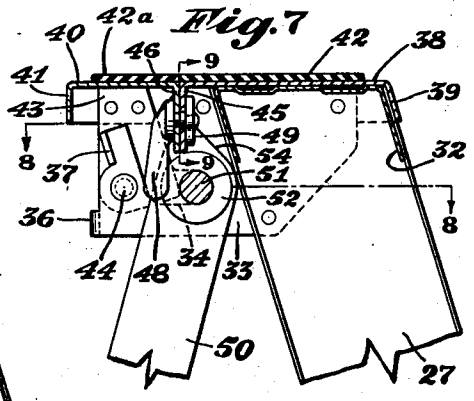
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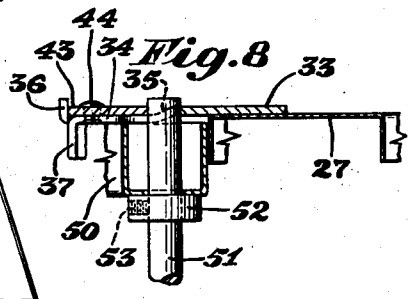
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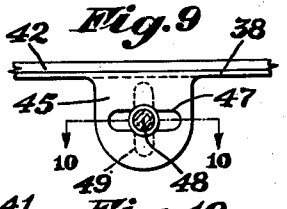
LADDER STRUCTURE

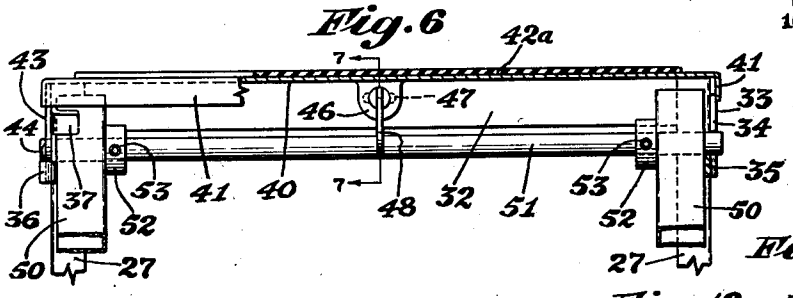
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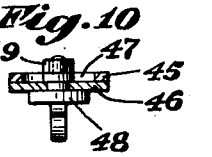


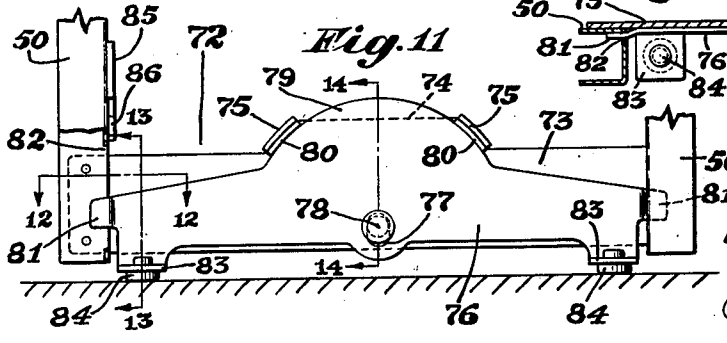


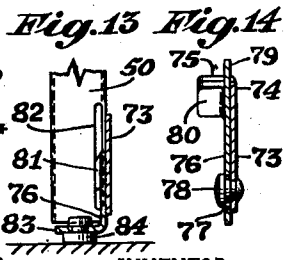












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LADDER STRUCTURE

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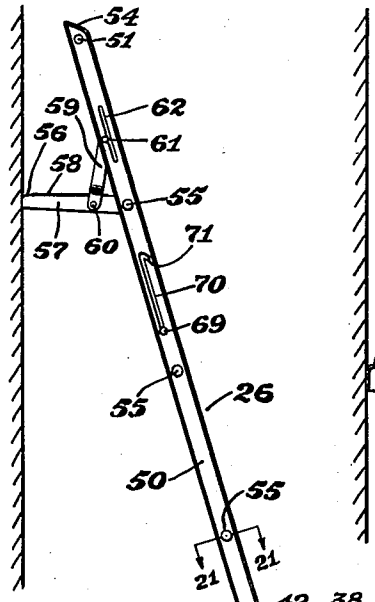


Fig. 18

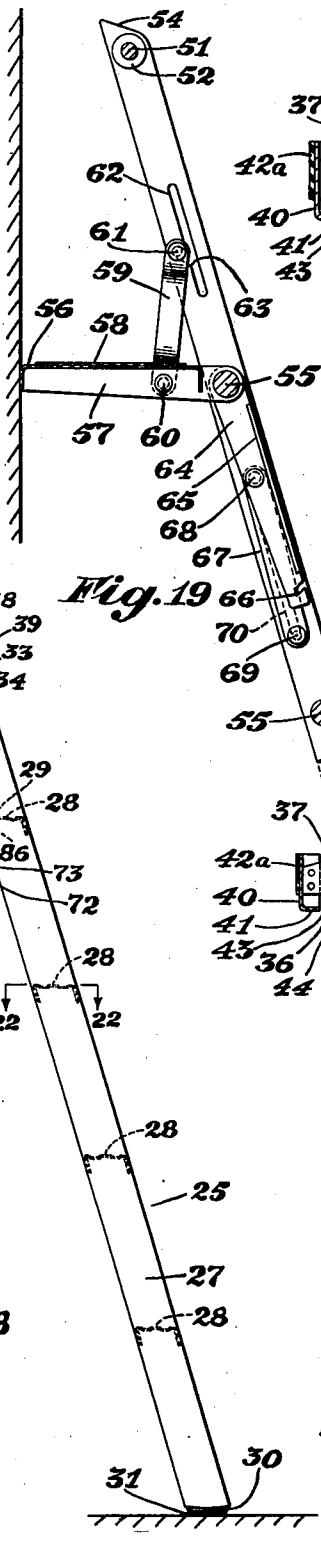


Fig. 19

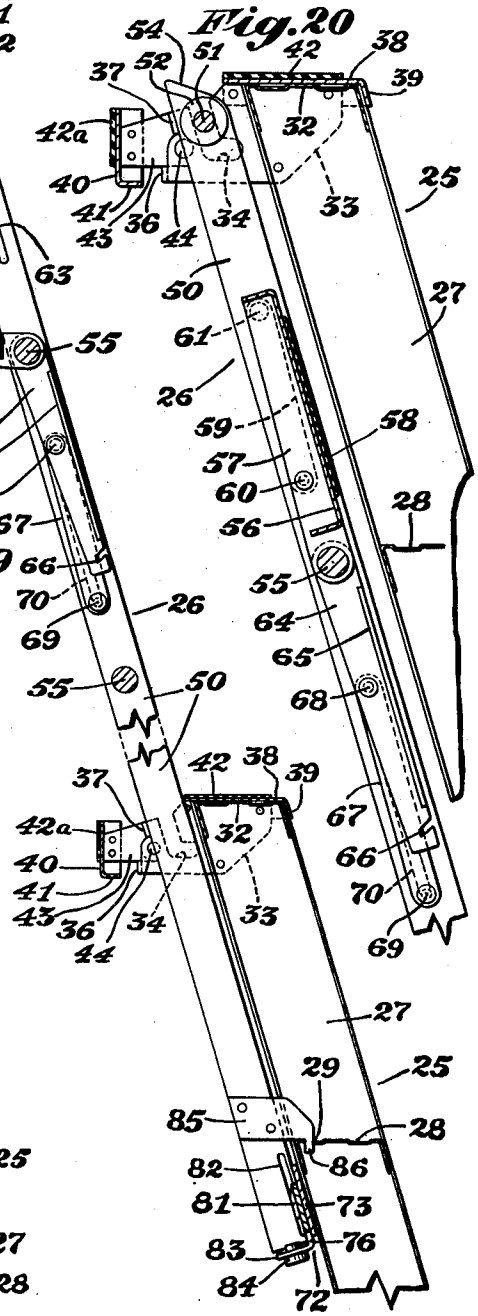


Fig. 20

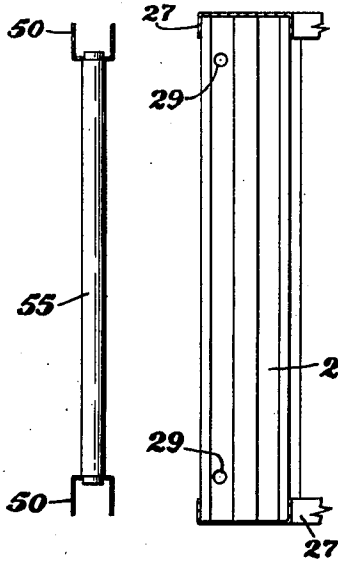


Fig. 21

Fig. 22

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UNITED STATES PATENT OFFICE

2,639,853

LADDER STRUCTURE

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Application December 5, 1947, Serial No. 789,962

4 Claims. (Cl. 228—21)

1

This invention relates to improvements in ladder structures and aims primarily to provide a ladder structure especially adapted and designed for selective employment, either as a conventional stepladder, or as an adjustable extension ladder.

Another and important object of the invention is the provision of a convertible ladder structure, which may be rapidly and readily set up either as a stepladder or as an extension ladder, and which may also be similarly converted from use as a stepladder to use as an extension ladder, or conversely.

A further object is to provide a convertible ladder structure having a high degree of rigidity when employed either as a stepladder, or as an extension ladder.

A still further object is to equip a convertible ladder structure with a novel combination utility shelf and spacer, which is foldable therein when not in use and is unfolded therefrom to function as a utility shelf when the structure is employed as a stepladder and to function jointly as a utility shelf and spacer when the structure is employed as an extension ladder whereby the upper end of the same is spaced from the wall or other support surface.

A still further object is to equip a ladder structure with a novel self-positioning stabilizer especially suitable for use upon and automatic conformity with the contours of uneven or sloping floor or other surfaces, whereby the ladder structure is positively maintained or supported in balanced relationship upon such surfaces.

The above, and additional objects which will hereinafter be more specifically treated are attained by such means as are shown in the accompanying drawings, described in the following specification and then more clearly pointed out in the claims, which are appended hereto and form a part of this application.

With reference to the drawings, in which there is illustrated one embodiment of the invention, and throughout the several views of which like characters of reference designate similar parts:

Figure 1 is a side elevation of the ladder structure comprehended by the present invention, as it would appear when folded and not in use;

Fig. 2 is a front elevation of the same;

Fig. 3 is an enlarged fragmentary rear elevation thereof, as seen on the line 3—3 of Fig. 1;

Fig. 4 is an isometric perspective view of the ladder structure, as it would appear when unfolded and employed as a conventional stepladder;

Fig. 5 is an enlarged fragmentary view, partially in side elevation and partially in longitudinal vertical section, of the upper portion of the ladder structure when the same is unfolded and in use as a stepladder;

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Fig. 6 is an enlarged fragmentary rear elevation of the upper end of the ladder structure with certain parts broken away and shown in section for clarity of illustration;

Fig. 7 is an enlarged fragmentary longitudinal vertical section of the same on the line 7—7 of Fig. 6;

Fig. 8 is an enlarged fragmentary horizontal section on the line 8—8 of Fig. 7;

Fig. 9 is an enlarged fragmentary transverse section on the line 9—9 of Fig. 7;

Fig. 10 is a horizontal section on the line 10—10 of Fig. 9;

Fig. 11 is an enlarged rear elevation, as seen on the line 11—11 of Fig. 1, of the self-positioning stabilizer evolved by the present invention, as it would appear when operatively mounted upon the lower portion of the ladder structure back frame, certain parts of the latter being broken away for clarity of illustration;

Fig. 12 is a horizontal section on the line 12—12 of Fig. 11;

Figs. 13 and 14 are vertical sections on the lines 13—13 and 14—14, respectively, of Fig. 11;

Fig. 15 is an enlarged fragmentary view in elevation of the inner side and lower end portion of one of the step section channel-shaped side rails of the ladder structure having non-scuffing and non-skid means attached thereto;

Fig. 16 is a vertical section of same on the line 16—16 of Fig. 15;

Fig. 17 is a rear elevation of the lower portion of the ladder structure back frame illustrating the self-positioning stabilizer of same, as the latter would appear when supporting said back frame upon a sloping or uneven surface;

Fig. 18 is a side elevation of the ladder structure of the invention, as it would appear when adjusted and employed as an extension ladder;

Fig. 19 is an enlarged fragmentary vertical section of the upper portion of the same;

Fig. 20 is an enlarged fragmentary vertical section of the upper portions of the ladder structure sections, as they would appear in an intermediate position while being adjusted or extended for use as an extension ladder, and

Figs. 21 and 22 are horizontal sections on the lines 21—21 and 22—22, respectively, of Fig. 18.

The ladder structure of the present invention essentially consists of a step section or unit 25 and a combination or convertible stepladder back frame and extension ladder section or unit 26, which latter is hingedly interconnected with the step section 25 when the ladder structure is employed as a conventional stepladder and when the same is to be used as an extension ladder, said section 26 is longitudinally slidable and/or vertically adjustable upon the section 25 to provide an extension ladder of a predetermined or selected length.

As now constructed, the step section or unit **25** is provided with upwardly converging channel-shaped side rails or members **27**, having the flange portions thereof directed inwardly, said side rails **27** being maintained in fixed convergent relation by a series of parallel spaced and progressively shorter channel-shaped steps or treads **28** having their flange portions directed downwardly and their end portions seated or interfitting within the channel-shaped side rails **27**, whereat the flange portions of the latter are rigidly secured to the flange portions of the steps **28**, as by countersunk rivets, spotwelding, or the like. For a purpose hereinafter set forth, each of the steps **28** are provided adjacent their rear edges with uniformly spaced apertures or holes **29**, and to provide a more secure footing for the user, the tread portions of the steps **28** are preferably grooved or ribbed lengthwise, as shown more clearly in Figs. 4 and 22.

Seated within the lower ends of the channel-shaped side rails **27** in abutting relation with the inner faces of the inwardly directed flange portions thereof and rigidly secured thereto, as by countersunk rivets, spotwelding, or the like, are the upwardly extending legs of U-shaped members **30**, the lower arcuate portions of which normally extend below the plane of the lower edges or ends of the side rails **27**, substantially in the manner shown in Fig. 16. Cemented or vulcanized upon the lower faces of the arcuate portions of the members **30** are pads **31**, of rubber or the like, which pads are provided to effectually prevent scuffing of the ladder supporting surface or skidding of the same thereon.

Seated within the upper converging ends of the side rails **27** are the terminal portions of a channel-shaped spacer member **32**, the flanges of which extend downwardly and are rigidly secured at their ends to the flanges of the side rails **27**, in the identical manner as above described for the steps **28**. However, it should be here noted that in some instances the member **32** is omitted in the ladder structure.

Rigidly secured to the outer faces of the side rails **27** at the upper ends thereof and extending rearwardly therefrom are combination hinge and guide plates or members **33**, the rearwardly extending portions of which are provided with slots **34**, of obtuse-angle formation, the shorter or normally horizontal legs of which have semi-circular terminals, to provide hinge seats thereat, as hereinafter described, while the longer or upwardly extending legs of said slots are normally disposed in spaced parallel relation to the side rails **27** and have open upper ends, as shown more clearly in Figs. 7, 19 and 20, to effect and permit longitudinal adjustment of the sections **25** and **26** relative to each other in a manner hereinafter more fully set forth. The portion of each plate **33** rearwardly of its obtuse-angle slot **34** is inwardly and vertically offset adjacent the semi-circular terminal of said slot, an amount substantially equal to the thickness or gauge of the plate material, as and in the manner more clearly indicated at **35** in Figs. 6 and 8 and for a purpose hereinafter made more apparent. The lower portion of the rear edge of each plate **33** is provided with an outwardly projecting limit or stop lug **36** formed by cutting an extension of the plate material on said rear edge and then bending such extension outwardly upon itself at right angles. The upper portion of the rear edge of each plate **33** is provided with an integral inwardly projecting and inclined extensible ladder guide lug **37** formed by cutting an extension of the plate material upon said rear edge, in the arcuate manner more clearly shown in Fig. 7, and then bending such extension inwardly upon itself at right angles to the plane of the plate **33** and in spaced parallel relation to the upwardly extending leg of the obtuse-angle slot **34**. In the cutting or forming of each of the combination hinge and guide plates **33**, the upper edge of that portion of the same extending rearwardly of its correlated side rail **27** is cut away in a downwardly and rearwardly sloping direction, substantially in the manner more clearly illustrated in Figs. 7, 19 and 20, to thereby remove excess or unnecessary material therefrom and thus provide essential and necessary clearances both during and after assembly of the parts now to be described.

The upper end of the ladder structure is provided with a sectional or two-part top step or tread, which also functions as a top cover therefor and as now constructed essentially consists of a relatively wide rectangularly shaped rigid cover section **38** having an integral flange **39** depending from the forward edge and ends thereof and a relatively narrow rectangularly shaped hinged cover section **40** having a similar flange **41** depending from the rear edge and ends thereof. The upper surface of the sectional top step or tread is provided with a sectional rectangular pad of suitable material, such as sheet rubber or the like, having a criss-crossed or roughened non-slip surface, the wider section **42** of said pad being cemented to or vulcanized upon the rigid section **38**, while the narrower section **42***a* of such pad is similarly secured to the hinged section **40**.

The rigid cover section **38** is adapted and provided to enclose the upper end of the step section or unit **25**, accordingly, the front portion of the depending flange **39** of said cover section snugly fits, at its ends, upon the upper marginal portions of the front flanges of the step section side rails **27**, while, the end portions of said flange **39** similarly fit upon the upper marginal portions of the combination hinge and guide plates **33** forwardly of the obtuse-angle slots **34** thereof, whereat, said end portions of the flange **39** are fixedly secured to said marginal portions of the plates **33**, as by countersunk rivets, spotwelding, or the like.

The hinged cover section **40** is carried by combination hinged support and retainer arms or members **43**, which are riveted or spotwelded at their upper ends to the inner faces of the end portions of the depending flange **41** of said section **40**, wherefrom they extend downwardly and inwardly for abutment with the outer faces of the inwardly and vertically offset portions of the combination hinge and guide plates **33** extending rearwardly of the obtuse-angle slots **34** of the latter, said arms being hingedly or pivotally connected at their lower and outer rounded corners to said offset portions of the plates **33**, substantially in the centers of the same, as by hinge or pivot pins **44** carried by the latter. When thus hingedly or operatively mounted upon the offset portions of the plates **33**, as above described, the arms **43** are disposed in the vertical planes of the portions of the plates **33** forward of the slots **34**, as and in the manner more clearly shown in Fig. 8, so that the upwardly and rearwardly sloping forward edges of said arms **43** will normally abut or contact the opposing forward edges of the upper legs of the obtuse-angle slots **34**, when the cover section **40** is in its elevated or raised posi-

tion to complement the rigid section **38** and thereby form and complete the sectional top step or tread of the ladder.

To positively retain and secure the sections **38** and **40** of the sectional top step in clamped or rigid relation, the rear edge of the section **38** is provided, midway the length thereof and in flush relation, with an integral dependent semi-circular lug **45** and the forward edge of the section **40** is similarly provided with an integral dependent semi-circular lug **46**, the first mentioned lug **45** having a transversely disposed latch slot **47** symmetrically formed therein, while the last mentioned lug **46** is provided with a winged latch operating member **48** adapted to be concentrically and rotatively mounted therein and having a latch **49** fixedly and symmetrically secured upon its forward terminal for registration with and passage through the slot **47**, whereby latching or locking action of the latch **49** upon the forward face of the lug **46** is effected, as will be manifest and apparent by reference to Figs. 7, 9 and 10.

Returning now to the combination stepladder back frame and extension ladder section or unit **26** for a detailed description of the same, such back frame and ladder section is provided with spaced parallel channel side rails **50** having their flanges directed outwardly, whereby the flat smooth opposing faces of the webs of said channel side rails are utilized for mounting purposes hereinafter made apparent.

For hingedly interconnecting the upper end of the back frame and ladder section **26** with the upper end of the step section **25**, a transversely disposed hinge rod or shaft **51** is freely and medially mounted, adjacent the ends thereof, in the upper terminal portions of the webs of the side rails **50** with the end portions of said hinge rod extending outwardly from said side rails to be normally journalled for hinging movement within the semi-circular terminals of the obtuse-angle slots **34** provided in the hinge and guide plates **33** and to be positively retained or locked in seated relation within such terminals by the lower and forward corners of the support and retainer arms **43** frictionally abutting or engaging the peripheral surfaces of said end portions, as more clearly shown in Figs. 1, 4 and 5, said end portions being so retained in said terminals, except, when the back frame and step section **26** is to be extended to convert the ladder structure to an extension ladder, as hereinafter described.

To effectually prevent relative displacement between the combined hinge and guide plates **33**, the side rails **50** and the hinge rod or shaft **51**, the edges of the rear flanges of said side rails **50** normally abut or bear against the inner surfaces of the rearwardly disposed and offset portions of said combination hinge and guide plates **33**, see Figs. 6 and 8, while, retaining collars **52** concentrically mounted upon said hinge rod **51** normally abut or bear against the inner surfaces of the webs of said side rails and are locked against axial movement upon the hinge rod by headless set screws **53**. Also, to assure of effective and proper hinging interaction between the upper ends of the sections **25** and **26**, the webs and forward flanges of the side rails **50** of the section **26** in a plane above the axis of the ringe rod or shaft **51** are provided with curvilinear and rearwardly and upwardly sloping portions **54**, the curvilinear surfaces of which normally abut or bear against the adjacent outer surfaces of the rear flanges of the side rails **27**, as and when the ladder structure is employed as a conventional

stepladder, and substantially in the manner more clearly illustrated in Fig. 7. In certain instances, ladder structures are fabricated with the sloping portions **54** omitted, in which event the upper ends of the side rails **50** are formed in semi-circular shape in concentric relation with the hinge rod **51**.

The combination back frame and extension ladder section **26** is provided intermediate its length and at suitably spaced intervals with a series of transversely disposed parallel rungs **55**, preferably although not necessarily of round cross-section, the reduced or shouldered terminals of which are medially seated within the web portions of the side rails **50**, as shown in Figs. 3 and 21, respectively.

Pivotally or hingedly mounted upon the uppermost rung **55** of the section **26**, adjacent the ends thereof and for folding into or upon said section when not in use, is a combination utility shelf and spacer **56** adapted to function strictly as a utility shelf, as and when the present structure is used as a conventional stepladder, and to function both as a utility shelf and as a spacer when said structure is employed as an extension ladder, as will hereinafter be made more apparent. As now fabricated, the utility shelf **56** is provided with an integral depending and stiffening perimetral flange **57**, the end wall portions of which extend forwardly from the shelf to function as ears for effecting a pivotal or hinge connection between said shelf **56** and the aforementioned rung **55**, as will be manifest and apparent by referring to Figs. 3, 4, 5 and 19. The upper surface of the shelf **56** is provided with a rectangular pad **58** of suitable material, such as sheet rubber or the like, having a criss-crossed or roughened non-slip surface, said pad being cemented to or vulcanized upon the shelf in a well known manner.

The utility shelf **56** is maintained and supported in a folded inoperative position within the confines of the section **26** and in both a lowered or unfolded operative position as a utility shelf or in an intermediate position as a combination shelf and spacer by bracing or supporting links **59** pivotally connected at their lower ends, as by pivot pins **60**, to the outer faces of the end wall portions of said shelf's perimetral flange **57**, at points thereon substantially midway between the transverse center of the shelf **56** and its hinged connection with its correlated rung **55**, see Figs. 3, 4, 5 and 19, while, the upper ends of said links **59** have floating pivotal connection with the side rails **50** of the section **26** through the medium of pivot pins **61** carried by said upper ends, the outer ends of which pivot pins are slidably mounted within slots **62** formed lengthwise within the webs of said side rails **50** in forwardly offset relation to the median lines thereof and at points therein intermediate the hinge rod **51** and the uppermost rung **55**. For specifically maintaining and supporting the shelf **56** when the same is employed for both utility purposes and as a spacer the rear edges of the slots **62**, substantially midway their length are provided with rearwardly and upwardly inclined notches **63**, which function in a manner as hereinafter more fully set forth in the extensible feature of the present invention.

Also pivotally or hingedly mounted upon the uppermost rung **55** of the section **26**, intermediate the side rails **50** and the hinged terminals of the utility shelf **55**, for folding into or upon said section when not in use and for bracing and interlocking the sections **25** and **26** when the

present structure is employed as a conventional stepladder, are interlocking arms or members 64 having integral stiffening lateral webs 65 extending inwardly from the upper edges thereof and also having in said upper edges, adjacent the free outer ends of said arms or members, angularly cut notches 66 for receiving and engaging the lower edge of the rear flange of the uppermost channel-shaped step or tread 28, substantially in the manner illustrated in Figs. 4 and 5.

For the purpose of maintaining and retaining the interlocking arms or members 64, either in their folded or inoperative position relative to the section 26, or in their elevated or unfolded operative position for bracing and interlocking the sections 25 and 26 for use as a stepladder, bracer links 67 are provided having their upper ends pivotally connected, as by pivot pins 68, to the outer sides of the arms 64 at points on the latter substantially midway their length, while, the lower or opposite ends of said bracer links 67 have floating pivotal connection with the side rails 50 of the section 26 through the medium of pivot pins 69 carried by said lower ends, the outer ends of which pivot pins are slidably mounted within slots 70 formed lengthwise within the webs of said side rails 50 in rearwardly offset relation to the median lines thereof and at points intermediate the uppermost rung 55 and the run next below. The slots 70 at their upper ends are provided with downwardly and forwardly sloping notches 71, wherein the pivot pins 69 are adapted to seat when the arms 64 are in their braced and elevated position for interlocking the sections 25 and 26.

The combination back frame and extension ladder section 26 of the ladder structure, when the latter is employed as a conventional stepladder, is supported by or on a self-positioning stabilizer 72, fabricated and operatively mounted upon the lower end portions of the side rails 50 of said section 26 in the following manner. The numeral 73 designates a rectangular transversely disposed stabilizer support plate or member, the terminal portions of which abut and are riveted, spotwelded, or otherwise fixedly secured to the outer faces of the forward flanges of said side rails 50 and hence also functions to interconnect the latter in rigid parallel relation. The stabilizer support plate 73 upon its upper edge and midway its length is provided with a portion 74 which extends upwardly therefrom in prolongation thereto, said portion 74 having at the ends thereof rearwardly extending bearing lugs 75, which are bent from the material of said portion substantially at right angles thereto and are also transversely curved concentrically with and are disclosed in symmetrical radial relation to the pivotal mounting of the self-positioning stabilizer member now to be described.

Mounted in abutting relation upon the outer or rear face of the stabilizer support plate 73 for floating or free pivotal movement relative thereto is a transversely disposed and self-positioning member or plate 76 having a vertical slot 77 formed therein midway the length thereof and adjacent the lower edge portion of same, said lower edge portion being curved downwardly at said slot to accommodate the same, as shown in Fig. 11. The self-positioning stabilizer member 76 is positively retained in abutment with and floating relation upon the stabilizer support plate 73 by a shouldered or stepped pivot pin 78, which extends through the slot 77 and at its reduced forward end is riveted or otherwise fixedly secured to the support plate 73 midway the length thereof and adjacent the lower edge portion of the same, as shown in Fig. 14.

The self-positioning stabilizer member 76 is provided upon its upper edge and midway its length with a substantially semi-circular extension 79, the perimeter of which is substantially concentric with the axis of the pivot pin 78, said perimeter adjacent the ends thereof having rearwardly extending bearing lugs 80, which are bent from the material of the extension 79, substantially at right angles thereto and are also transversely curved to dispose their inner faces in the plane of said perimeter, and in addition thereto such lugs 80 are located upon the perimeter of the extension 79 to normally lie in the radial planes of and are companion to the support plate lugs 75, whereby the latter rest upon and are supported by the lugs 80 when the ladder structure is employed as a stepladder, as will be manifest and apparent by referring to Fig. 4, or as shown in Fig. 17, wherein the self-positioning stabilizing member 76 is illustrated as compensating for an uneven or sloping surface, at which time the major portions of the lugs 75 rest upon and are supported by the lugs 80.

The upper edge of the stabilizing member 76, at each end of the semi-circular extension 79, slope downwardly and outwardly to laterally offset terminal portions 81 of said member 76, which portions extend through vertical guide slots 82 formed in the webs of the side rails 50 adjacent the forward edges thereof, said portions and slots jointly functioning as guides for the stabilizing member 76 and also to limit or restrict the pivotal or rocking action of said member upon the support plate 73 as will be obvious by referring to Figs. 4 and 11.

The lower edge of the stabilizing member 76, adjacent the laterally offset terminal portions 81 thereof, are provided with rearwardly extending support lugs 83 having centrally disposed nonscuffing and non-skid floor contacting knobs or studs 84, of rubber or other suitable material, removably mounted or seated therein for effecting rapid and ready replacement of the same.

To support the combination back frame and extension ladder section 26 in any desired or selected longitudinally adjusted position upon and relative to the step section 25, when the ladder structure of the present invention is employed as an extension ladder of the requisite length, and also to interlock said sections in such adjusted position, the extensible step section 26 is provided with support lugs 85, which are rigidly secured, as by riveting, spotwelding, or the like, to the inner opposing faces of the side rails 50, adjacent the self-positioning stabilizer 72, and which extend forwardly from said side rails 50 and at their forward outer ends are provided with dependent pin-like projections 86 adapted to enter the apertures 29 of the selected step or tread 28 and to be restrainingly engaged within said apertures 29 when the lower edges of the forwardly extending portions of the support lugs 85 are resting upon or supported by the rear edge portion of said selected step or tread 28, substantially in the manner more clearly illustrated in Fig. 19.

In the employment of the present ladder structure, when the same is to be used as a stepladder, the user stands facing the step section 25 and firmly grasps the side rails 50 thereof, which action causes the free hinged section 26 to swing

backwardly by gravity, to thus effect spreading of the sections 25 and 26 into the usual stepladder formation and the simultaneous contacting of the stabilizer 72 with and the automatic conformance of the same to the contour of the floor or other support surface; following which the user elevates or raises the interlocking arms 64 to their substantially horizontal positions to permit the notched terminals of same to restrainingly engage the rear flange of the uppermost step or tread 28, which arm movements automatically and simultaneously raise the pivot pins 69 of the bracer links 67 from the lower ends of the slots 70 to the upper ends of same, at which time the user applies downward and forward pressure upon the lower rear edges of the brace links 67 to cause the pivot pins 69 of same to drop and seat within the notches 71 of the slots 70, and thus effect joint and rigid interlocking of the sections 25 and 26 and the arms 64. The utility shelf 56 is next lowered to a substantially horizontal position, at which time the pivot pins 61 move from the upper ends of the slots 62 to the lower ends of the same, this completes the setting up of the stepladder which may then be moved as a rigid structure to its point of use. The stepladder, after use, is collapsed or folded for stowage by reversing the above described procedure.

When the ladder structure is to be employed as an extension ladder, the user supports said structure with one hand and with the other releases the latch 49 and lowers the hinged cover section 40 of the topmost tread to its horizontal position, the end portions of the hinge rod 51 are next unseated from the semi-circular ends of the obtuse-angle slots 34 and moved rearwardly to register with the upwardly extending and open-ended legs of said slots, following which the combination back frame and extensible step section 26, guided by the guide lugs 37, is longitudinally extended or moved upwardly upon the step section 25 until the topmost rung 55 of the section 26 is clear of the upper end of the step section 25, at which time, further upward movement of the section 26 is temporarily halted to permit the lowering or positioning of the utility shelf 56 on the extension ladder, for use both as a shelf and as a spacer therefor, which lowering is effected by swinging said shelf outwardly to an intermediate angular position in relation to the section 26 and interlocking the bracing links 59 of said shelf with the side rails 50 of the section 26 by seating the pivot pins 61 of said links within the intermediate angular notches 63 of the slots 62 in said side rails. Upon completion of positioning of the utility shelf 56, the section 26 is elevated to the height desired and the pin-like projections 86 of the support lugs 85 are inserted within the apertures 29 of the selected step or tread 29, to permit the lower edges of said lugs to rest or seat upon the rear marginal portion of said selected step or tread, thus interlocking the sections 25 and 26 in longitudinally adjusted or extended relation, and conjointly with the guide lugs 37, such support lugs 85, function to maintain and retain said sections in rigid relation. Upon completion of the foregoing, the extension ladder thus formed is positioned upon the wall or other support surface with the rear edge of the utility shelf 56 bearing or resting upon said wall or surface, substantially in the manner illustrated in Figs. 18 and 19, to thus effectively maintain the upper end of such ladder in spaced relation therefrom, while, also permitting ready use of the shelf 56 for utilitarian purposes. The extension ladder after use is collapsed or folded for stowage by a reversal of the above described procedure.

The ladder structure, as herein disclosed, is fabricated principally from extruded aluminum channel sections for lightness and ease of handling. However, it is to be here clearly understood that the present disclosure is merely by way of illustration, inasmuch as, said ladder structure may be fabricated from any other suitable material of many other cross-sectional shapes.

Manifestly, therefore, the ladder structure of the present invention is extremely simple, compact, durable and economical in construction; is adapted for rapid and ready erection, either as a stepladder or as an extension ladder; possesses a high degree of rigidity when employed both as a stepladder and as an adjustable extension ladder; is rapidly and readily convertible from use as a stepladder to use as an extension ladder, and conversely; is positively balanced and stabilized when employed upon uneven and/or sloping surfaces; and will not damage nor mar floors, or other support surfaces when in use.

While I have herein shown and described the invention with sufficient detail to enable those skilled in the art to understand the mode of construction and principles involved, it is to be understood that there is no intentional limitation herein to the specific form and precise details of construction herein disclosed, except as expressly defined by the appended claims, and that various modifications of said construction may be resorted to without departing from the spirit of the invention or the benefits derivable therefrom. I also desire to have it understood that certain features of the invention herein disclosed may be employed in and with other combinations than those shown and described.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a convertible ladder structure, the combination of a step section including guide means carried by the upper end portions of the sides thereof, said guide means being provided with slots having open outer ends; a convertible stepladder back frame-extension ladder section including complemental hinge means carried by the upper end portions of the sides thereof and adaptable to be removably seated within the closed ends of said slots for establishing a hinged connection between said sections, whereby said convertible section is selectively employed in hinged relation with said step section to function as a stepladder, and co-operatively with the aforesaid guide means in guided longitudinally slidable relation upon said step section to function as an extension ladder; a sectional top step for said step section including a rigid section and a hinged section, said hinged section being adapted to coact with the complemental hinge means of said convertible section when said hinge means is seated in hinged relation within the closed ends of the slots of said step section guide means for effectively locking said hinge means within the closed ends of said slots; means operatively mounted upon one of said sections and releasably engageable with the other of said sections for interlocking the sections in rigid relation when functioning as a stepladder; and means rigidly secured to the lower portion of said convertible section and releasably and selectively engageable with the steps of said step section for interlock-

ing such sections in rigid relation to function as an extension ladder.

2. In a convertible ladder structure, the combination of a step section including rearwardly extending guide members carried by the upper end portions of the sides thereof, said guide members being provided with obtuse-angular slots having open upper ends; a convertible stepladder back frame-extension ladder section including a hinge rod carried by the upper end portion of same, the terminal portions of which rod are normally and removably seatable within the closed ends of said obtuse-angular slots for establishing a hinged connection between said sections, whereby said convertible section is selectively employed in hinged relation with said step section to function as a stepladder, and co-operatively with said rearwardly extending guide members in guided longitudinally slidable relation upon said step section to function as an extension ladder; a sectional top step for said step section including a rigid section and a hinged section, said hinged section being adapted to co-act with the terminal portions of said hinge rod when the same are seated in hinged relation within the closed ends of said obtuse-angular slots for effectively locking said terminal portions within the closed ends of said slots; means operatively mounted upon one of said sections and releasably engageable with the other of said sections for interlocking the step and convertible sections in rigid relation when functioning as a stepladder; and means rigidly secured to the lower portion of said convertible section and releasably and selectively engageable with the steps of said step section for interlocking such sections in rigid relation when functioning as an extension ladder.

3. In a convertible ladder structure, the combination of a step section provided at the upper end and sides thereof with rearwardly extending guide members having angular slots formed therein with open upper ends; a two-part top tread and cover for said step section including a fixed part and a hinged part, said fixed part being rigidly secured to the upper end of the step section and said hinged part being pivotally mounted upon the rear edge portions of said guide members for outward and downward swinging movement relative to said fixed part to provide a substantially rectangular opening therebetween; a convertible stepladder back frame-extension ladder section having a hinge rod at its upper end, the terminal portions of which are removably seated within said angular slots and are adapted to be normally locked therein by the hinged part of said top tread when the same is in its closed position for establishing a hinged connection between said step and convertible sections at the upper ends thereof, whereby said convertible section may be selectively employed in hinged relation with said step section to function as a stepladder, or unhinged from the step section for upward longitudinal sliding movement thereon through said rectangular opening for co-operative guidance by the aforesaid rearwardly extending guide members to function as an extension ladder; means pivotally mounted upon said convertible section and releasably engageable with said step section for inter-locking the step and convertible sections in rigid relation when functioning as a stepladder; and means rigidly secured to the lower portion of said convertible section and releasably and selectively engageable with the steps of said step section for interlocking said convertible and step sections in rigid relation when functioning as an extension ladder.

4. The combination with a convertible ladder structure, of a front step section having side rails rigidly connected at their upper ends by a relatively wide stationary tread section for a two-part top step; rearwardly extending plate brackets having their forward end portions rigidly secured to the outer faces of the terminal portions of said side rails having obtuse-angle slots with open upper ends formed within their free rear end portions; inwardly projecting extension ladder guide lugs formed in inclined relation upon the upper rear edge portions of said brackets; outwardly projecting stop lugs formed upon the lower rear edge portions of said brackets; a relatively narrow hinged tread section for said two-part top step mounted upon the lower rear end corner portions of said plate brackets for rearward and downward swinging movement to rest upon and be limited in said movement by the outwardly projecting lugs of said plate brackets to thereby provide a substantially rectangular opening between said hinged and stationary tread sections; a latch member carried by said hinged tread section and engageable with said stationary tread section for rigidly clamping said sections as a top step unit; a convertible section complemental to said step section including side rails, a series of uniformly spaced rungs and a transversely disposed hinge rod mounted within the upper end portions of said side rails with its terminal portions projecting therefrom adapted to seat within the closed ends of said obtuse-angle slots and to be positively locked therein by the abutting forward edges of said hinged and latched tread section for establishing a hinged connection between said step and convertible sections, whereby the convertible section may be employed in hinged relation with said step section to function as a stepladder, and/or to be unhinged therefrom for upward longitudinal sliding movement thereon through the aforesaid rectangular opening for co-operative guidance by the inwardly projecting and inclined extension ladder guide lugs of said plate brackets to function conjointly with the step section as an adjustable extension ladder.

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