July 9, 1940. W. W. SEIDNER 2,207,445

PLATFORM LADDER

Filed June 15, 1939 2 Sheets-Sheet 1

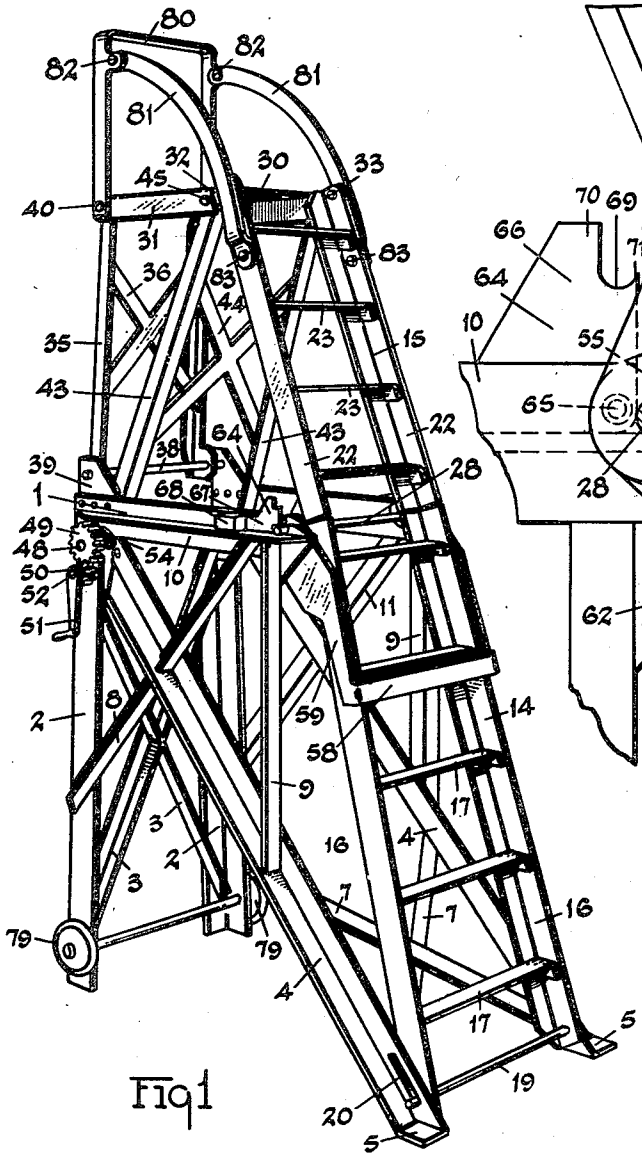

Fig 1

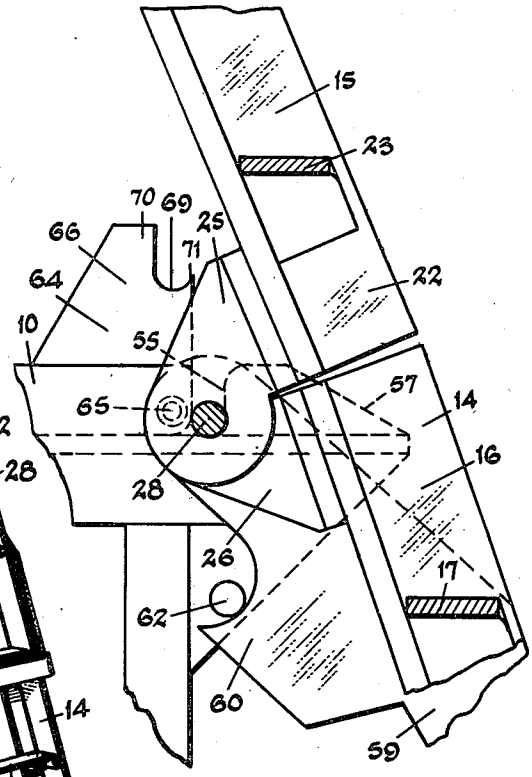

Fig 3

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PLATFORM LADDER

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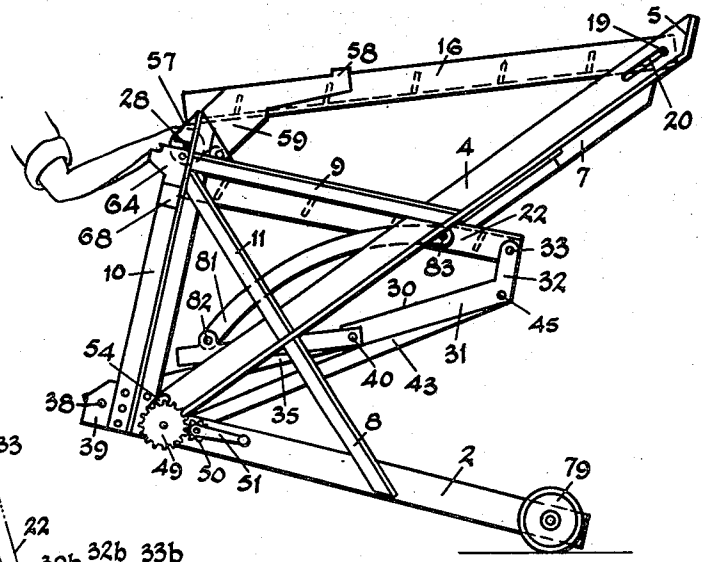

Fig 2

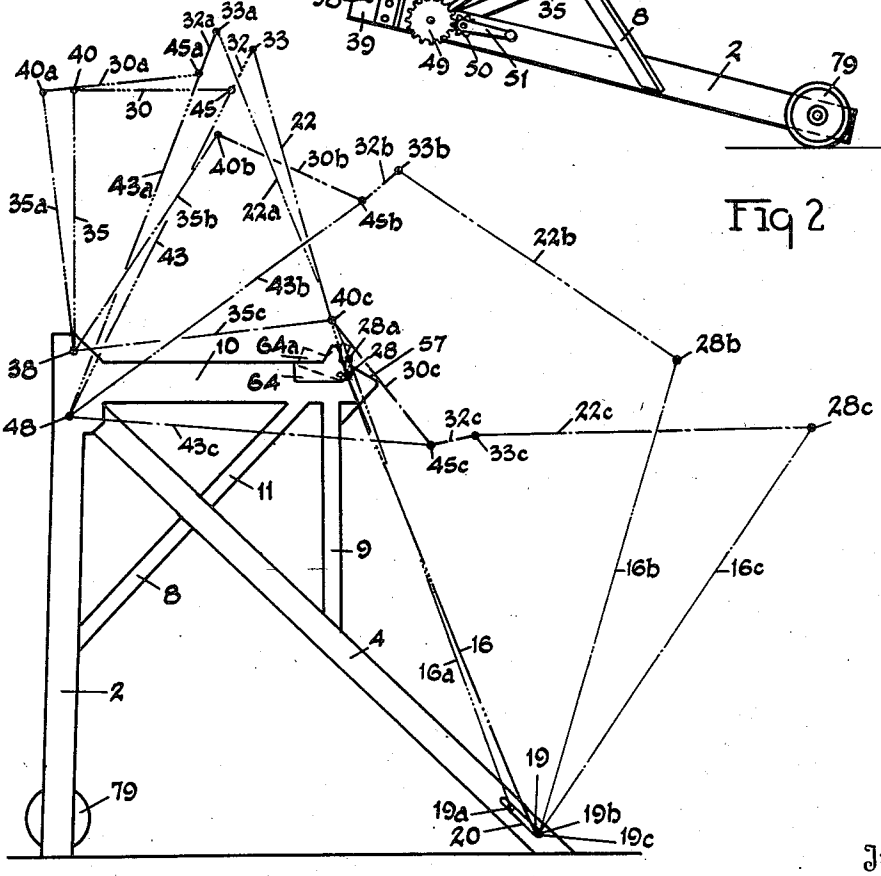

Fig 4

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2,207,445

PLATFORM LADDER

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Application June 15, 1939, Serial No. 279,307

4 Claims. (Cl. 228—37)

My invention relates to devices for facilitating an ascent and descent to and from places where provision for the same is not otherwise available. The invention, particularly, relates to a self-supporting ladder, having a platform or scaffold on and from which work, at some height, may be safely accomplished.

The invention has for an object to provide a platform ladder having a plurality of articulated and runged riser sections surmounted by and connected to a platform or scaffold portion and supported by a base frame. Thus, a platform ladder embodying the features of my invention may be set up for use without regard to extraneous props or support, other than that required for the base frame, thereby extending the field of adaptability of the platform ladder in practice.

Another object of the invention is to provide a platform ladder having a base frame on and with respect to which the riser sections and platform portion may be pivotally moved from a full extended and useful operative position to an infolded and readily trundable position. In this feature, the platform ladder embodying my invention may be easily moved from place to place with a minimum of effort and conflict with other bodies, notwithstanding its capacity to be extended to reach considerable heights, when in an operative position.

A still further object of the invention is to provide a platform ladder having a base frame on which is provided a means for lifting the platform portion and adjoining articulated riser sections from said infolded position to an operative position of use and for lowering said platform portion and riser sections from said operative position to said infolded position. By the provision of said means, the manipulation of the riser sections and platform portion, with their displaced centers of gravity and extended dimensions and mass, may be handled and controlled from a single point, either by manual or motor actuation of said means. The said means further provides a supporting structure to the platform portion when the platform ladder is in an operative position, thus eliminating the need for provision of additional elements with its incidental multiplication of parts and cost.

A further and more particular object of the invention is to provide a platform ladder having pivotally interjoined riser sections, which, when located in operative position, automatically lock against angular movement in a direction as would normally cause the infolding of the sections. The sections are so related when in operative position, that the weight applied thereto and to the platform portion acts to increase the force with which the sections are locked against said angular movement. My invention, also, contemplates the provision of an independent lock bar, which may be located in a position to positively lock the riser sections to the base frame and has portions which barricade against an ascent of the riser sections until the lock bar is moved to said locking position.

The invention consists in other features and advantages which will appear from the following description and upon examination of the drawings. Structures containing the invention may partake of different forms and still embody the invention. To illustrate a practical application of the invention, I have selected a platform ladder as an example of the various structures and details thereof that contain the invention and shall describe the selected structure hereinafter, it being understood that variations may be made without departing from the spirit of the invention. The particular structure selected is shown in the accompanying drawings and described hereinafter.

Fig. 1 of the accompanying drawings illustrates a perspective view of a platform ladder embodying the features of my invention, in an operative position of use. Fig. 2 illustrates a side view of the platform ladder shown in Fig. 1, in an infolded position for trundling. Fig. 3 illustrates an enlarged view of a joint between two adjacent riser sections of the platform ladder, shown in Fig. 1. Fig. 4, diagrammatically, illustrates the various positions taken by the platform ladder parts in moving to and from the operative position, shown in Fig. 1, and the infolded position, shown in Fig. 2 of the drawings.

The platform ladder embodying the features of my invention has a base frame 1. The base frame 1, in the main, may be formed from angle iron and has uprights 2, interjoined by latticed bars 3, and shores 4, which may be bolted to the upper ends of the uprights 2. The shores 4 may be provided with feet 5 and form, together with the uprights, legs of the base frame 1. If desired, the shores 4 may be interjoined by latticed bars 7 and may be each connected by brace bars 8 to the uprights 2. Extending vertically, from a point on each shore 4 intermediate the ends thereof and parallel to the uprights 2, is a stud 9, one end of which is connected to the shore 4, and the other end of which is connected to a cross bar 10. The cross bar 10 is likewise con-

nected to the upper ends of the uprights 2. If desired, a brace bar 11 may be located in alignment with each brace bar 8 and may be connected to and extend between each shore 4 and cross bar 10. Thus, the base frame 1 is rendered exceedingly rigid, the extended relation between the shore feet 5 and the lower ends of the uprights 2 providing well displaced points of support adapted to support a mass, whose center of gravity may be located anywhere within a relatively large working area above the base frame. The base frame 1 not only supports the runged riser sections and platform portion, when in operative position, but, also, forms a skeletonized enclosure, into which the sections and platform portion may be located when in infolded position, for ease of trundling the platform ladder from place to place.

The runged riser sections of the platform ladder illustrated in the accompanying drawings, include a lower section 14 and an upper section 15. The lower section 14 may be formed from a pair of angle bar risers 16 interjoined, at approximately spaced step points, by rung plates 17. The section 14 is pivotally connected to the base frame 1, as by a rod 19, which may extend between the lower ends of the risers 16 and through openings 20 formed in the shores 4. For purposes that hereinafter will be described, the openings 20 are extended to form slots that permit movement of the lower end of the section 14 in a direction compound to true vertical and horizontal directions. Thus, the slotted openings 20 may extend parallel to the major dimension of the shores 4. The next adjacent section, which, in the platform ladder selected for purposes of illustration, is the upper section 15, is pivotally connected to the upper end of the section 14.

The section 15 may be formed from a pair of angle bar risers 22 interjoined, at appropriately spaced step points, by rung plates 23. Each riser 22 may be provided at its lower end with an ear 25 that may be so located as to register with an ear 26 provided at the upper end of each riser 16 of the section 14 and, when thus registered, deposes the adjoining ends of the risers 16 and 22 in a common plane. A pintle rod 28 passes through said ears 25 and 26 and thereby pivotally connects the sections 14 and 15. The section 15 is connected at its other or upper end to the platform portion of the platform ladder.

The platform portion may be formed from a metal plate 30 of some area, to form a scaffold or dais, from which work, at some height, may be safely and efficiently conducted. The plate 30 has flanges 31, from which may extend suitable brackets 32 for receiving pivot pins 33 connecting the plate 30 to the upper end of the risers 22. The platform portion is raised, as are the riser sections 14 and 15 articulated thereto, by a means which, also, operates to support the platform plate 30 in operative position.

Said means, in the selected structure, includes a pair of bars 35 suitably interconnected by latticed strips 36. An end of each of the bars 35 is pivotally supported on the base frame 1 as by a pintle rod 38 supported in bearing blocks 39 attached to the cross bars 10. The other ends of the bars are pivotally connected to the plate 30 by pins 40, which extend through the flanges 31 of said plate. In a sense, the bars 35 form a guiding boom for the movement of the platform portion and riser sections to and from operative and infolded positions. Only the actuating unit of said means includes, in the structure herein described, a pair of bars 43, each interconnected by latticed strips 44 and pivotally connected to the plate 30. Said pivotal connection may consist in pivot pins 45, which extend through the ends of the bars 43 and the flanges 31 at points spaced from the pivotal connection of the bars 35 and, preferably, proximate to the connection of the risers 22 to the plate 30. The other ends of the bars 43 are suitably keyed to a shaft 48, which is journaled in the base frame 1, as in the uprights 2. The shaft 48 may have a suitable means for rotating the same, such as the gear 49 keyed thereto and adapted to mesh with a pinion 50. The pinion 50 may be caused to rotate as by a hand crank 51 keyed to the stub shaft 52 of the pinion. Thus, as power is applied to the stub shaft 52 to rotate the pinion 50, gear 49, and shaft 48, the bars 43 will be swung angularly relative to the base frame 1 to move the plate 30 and the articulated sections 14 and 15 relative to said frame. If desired, a suitable pawl 54 may be pivotally mounted on the base frame to lock the gear 49 against rotation, at any desired point in the angular movement of the bars 43.

In order to establish a bracing and locking connection between the riser sections 14 and 15 with the base frame 1, the cross bars 10 are adapted to engage the pintle rod 28. Preferably, the cross bars 10 are provided with open-faced, vertical slots 55, into which the rod may be received. The mouths of the slots 55 are so located in the cross bars 10 as to require the sections 14 and 15 to be substantially in alignment in order for the rod 28 to enter the slots 55. The bases of the slots 55 are located so that when the rod 28 is located against the same, the sections 14 and 15 are disposed at a slight angle to each other, this being the operative position of the sections, the load sustained by the sections 14 and 15 tends to further urge the rod 28 toward the base and within the confining dominion of the slots 55. The rod 28 may be guided to the mouth of the slots 55 by a cam 57 formed on each cross bar 10. As the rod 28 engages the cams 57, the section 14 is raised, the slotted openings 20 permitting the same. Preferably, the cam 57 extends substantially parallel to the slotted opening 20, whereby the section 14 is moved in a translatory manner, as the rod 28 moves over the cam 57. The rod 28 moves from engagement with cam 57 toward the mouth of the slots 55 and into the slots by reason of the gravity pull of the then suspended lower section 14.

The movement of the rod 28 over the cam 57 is caused by the angular movement of the bars 43 in response to an application of power to the gear 49, in a direction to swing the bars 43 upwardly. The gravity pull on the articulated sections 14 and 15, while being somewhat resisted by said bars 43, exerts itself, after the rod 28 has disengaged the cam 57, and causes angular movement of the sections 14 and 15 toward the operative position, by reason of the control exercised by the edges of the slots 55 thereover. If desired, a means for locking the rod 28 within the slots 55 may be provided.

Said locking means may include parts forming a safety barricade to an ascension of the sections, until after the locking relation has been established. The locking means, herein selected, comprises a barricade bar 58 having legs 59 pivotally connected to the sections 14 and 15 by the rod 28. Each leg may have a hook portion 60 which, when the rod 28 is located proximate to the

bases of the slots 55 and the barricade bar 58 is moved toward the risers 16 of the section 14, engages locking pins or bosses 62 located on the base frame 1. When the bosses 62 are, thus, engaged, the sections 14 and 15 will be locked against movement relative to the base frame 1.

When it is desired to move the ladder parts from an operative position to an infolded position, the operator takes a position adjacent the crank 51 for application of power to the gear 49 to cause the bars 43 to swing upwardly and move the rod 28 from within the slots 55. In order to provide means for automatically swinging the rod 28 to engage the cam 57, during movement toward the infolded position, suitable conveyor links 64 are pivotally mounted, as by pins 65, on the cross bars 10. The conveyor links 64 are, preferably, bell-crank in form having an operating arm 66 and an arm 67, on which is supported a weight 68. Each operating arm has a recess 69 defined by a shoulder 70 and a lip 71. The distance between the base of the recess 69 and the pivotal connection of the respective pin is critical and sufficient so that when the arm 66 is moved angularly about its pivot, the recess comes into registration with the cam 57. In operation, the bars 43 having been swung to lift the rod 28 from the slots 55, the movement of the gear 49 is continued to further swing the bars 43 in the same direction until the rod 28 passes over the lip 71 and, by reason of the mass of the articulated sections, engages the shoulder 70. The gear 49 is rotated in the opposite direction to swing the bars 43 downwardly, producing a seating of the rod 28 in the recesses 69 and, on continued movement of the bars 43, a tipping of the arm 66. The tipping of the arm 66 conveys the rod 28 across and above the open mouths of the slots 55 and ultimately delivers the rod to engage the cam 57, the end of the sections 14 and 15, of course, moving with the rod 28. The continued movement of the bars 43 permits the rod 28 to move downwardly over the cam and the conveyor links 64 return to their normal position by reason of the pull exerted by the weights 68 on the arms 67.

Reference to the diagram of Fig. 4 of the accompanying drawings, in which the movable parts are shown in various positions during the progress of moving the same from an operative position to the infolded position may prove helpful. The lines numerically indicated in Fig 4, diagrammatically illustrate corresponding numbered parts found in the other drawing figures. Thus, the diagrammatic lines numbered 19, 16, 28, 22, 33, 32, 45, 43, 30, 35, and 64, in Fig. 4, illustrate the positions of the rod 19, risers 16, rod 28, risers 22, pivot pins 33, brackets 32, pivot pins 45, bars 43, plate 30, bars 35, and conveyor link 64, respectively, in their operative position and relation. The lines numbered 19*a*, 16*a*, 28*a*, 22*a*, 33*a*, 32*a*, 45*a*, 43*a*, 30*a*, 35*a*, and 64*a*, in Fig. 4, illustrate the positions of the correspondingly numbered elements during the period when the conveyor links 64 are carrying the rod 28 across the open mouth of the slots 55 and delivering the same to the cams 57, preparatory to infolding. The lines numbered, 19, 16, 28, 22, 33, 32, 45, 43, 30, and 35 *b* and *c*, respectively, in Fig 4, illustrate the positions of the correspondingly numbered elements during the progressive movement and changing relation thereof, in approaching the completely infolded position and relation shown in Fig. 2 of the drawings.

In this connection, it will be noted that the means which provides the bracing and locking connection for the sections 14 and 15, when in their operative position, performs a similar function when the parts are in their infolded position. The rod 28 is guided to the slots 55, as the sections 14 and 15 are being moved to their infolded position by the cam 57. Thus, as the bars 43 swing downwardly, the risers 22 will be drawn into the area defined by the base frame 1, drawing the risers 16 in the same direction. As the risers 16 approach a position to locate the rod 28 in registration with the slots 55, the section 14 moves downward to locate the rod 28 within the locking confines of the slots 55. The platform ladder is then in position for trundling, and to facilitate the same, the uprights 2 may be provided with suitable wheels 79, which, when the base frame 1 is tipped, as shown in Fig. 2, may form a rolling support for the infolded platform ladder.

The raising of the ladder may be accomplished by mere rotation of the gear 49, which swings the sections up from engagement with the base frame and into the operative position, as before explained. If desired, the platform portion may be provided with a guard rail means. Said guard rail means, preferably, includes an inverted U-shaped bar 80 pivotally connected, as by the pivot pins 40, to the metal plate 30 and a pair of side rails 81. Each side rail 81 extends along one side of the plate 30 and is pivotally connected to the bar 80, as by pivot pins 82, and to the risers 22, as by the pivot pins 83. As the platform ladder is moved to and from operative and infolded positions, the bar 80 is moved automatically by the side rails 81 to and from the guard rail and collapsed positions, respectively. Thus, the entire manipulation of the parts is under the unitary control of the gear 49 and is dependent upon rotation thereof.

While in accordance with the provisions of the statutes, I have illustrated and described the best form of my invention now known to me, those skilled in the art will readily understand that many changes may be made in the form of construction disclosed, without departing from the spirit of my invention as set forth in the appended claims.

I claim:

1. A platform ladder having a base frame; the base frame having leg parts; a riser section; one of the leg parts having a slotted opening; means extending through said opening for pivotally connecting one end of said riser section to said leg part; a second riser section; means for pivotally connecting one end of the second riser section to the other end of the first-named riser section; the base frame having a slotted part for receiving the last-named means when the riser sections are located in approximate ascendable alignment with each other to brace the same; a U-shaped bar pivotally supported by the first-named riser section, said bar having end portions adapted to engage the base frame to lock the first-named riser against movement relative to the base frame; a platform plate; linkage means connecting said plate to the base frame; means for pivotally connecting said plate to said second riser section; and a lever supported by said base frame and pivotally connected to said plate for elevating the plate relative to the base frame and drawing said sections into approximate ascendable alignment with each other.

2. A platform ladder having a base frame; a riser section; one end of the riser section connected to the base frame for angular movements

with reference thereto; a second riser section; means for pivotally connecting the other end of said first riser section to one end of the second riser section; the base frame having a slotted part; and an actuatable means supported by said base frame and connected to said second riser section for moving the same and to locate the first-named means in engagement with said slotted part whereby the riser sections may be held against movement by said base frame.

3. A platform ladder having a base frame; the frame having supporting legs; two of the legs having slotted openings extending parallel to each other; a riser section; means extending through said openings for connecting said riser section to the base frame; a second riser section; means for pivotally interconnecting said first-named and second riser sections; linkage means connecting said second-named riser section to said base frame; the base frame having a part adapted to be engaged by said second means for locking the same at a point proximate to a line extending between the points of connection of said first-named means and the linkage means with their respective riser sections.

4. A platform ladder having a base frame; a riser section; one end of the riser section connected to the base frame for angular movements with reference thereto; a second riser section; means for pivotally connecting the other end of said first riser section to one end of the second riser section; the base frame having a slotted part; an actuatable means supported by said base frame and connected to said second riser section for moving the same and to locate the first-named means in engagement with said slotted part whereby the riser sections may be held against movement by said base frame; and a conveyor link means pivotally supported on the base frame and movable to direct the first-named means away from said slotted part when movement of the riser sections relative to the base frame is desired.

WALLACE W. SEIDNER.