

- [54] **KNOCKDOWN LADDER WITH REMOVABLE RUNGS**
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- [51] Int. Cl. **E06c 1/38, E06c 7/50**
- [58] Field of Search **182/194, 228, 151, 220**

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[57] **ABSTRACT**

This disclosure relates to a novel knockdown ladder particularly adapted for use with a different number of rungs depending upon the particular height to which a person desires to climb comprising a pair of side rails carrying plates inboard thereof with upwardly opening U-shaped notches with the plates and side rails also defining an upwardly opening slot, a plurality of ladder rungs, a plate secured to each ladder rung at opposite ends thereof, and the rung and rung plates being contoured to the general shape of the notches and slots respectively whereby downward movement of each ladder rung relative to the side rails and transversely opposite side rail plates results in the reception of the rung plates into the associated slots and the reception of the ladder rung into the associated notches.

- [56] **References Cited**
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5 Claims, 4 Drawing Figures

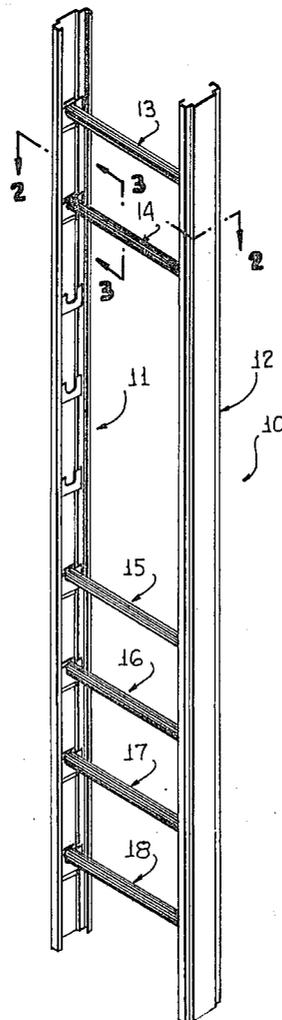


FIG. 1

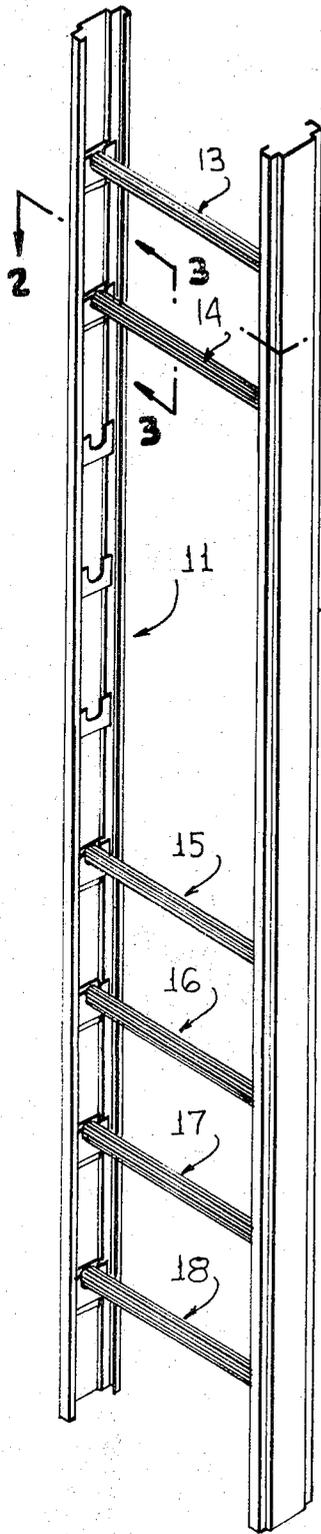


FIG. 2

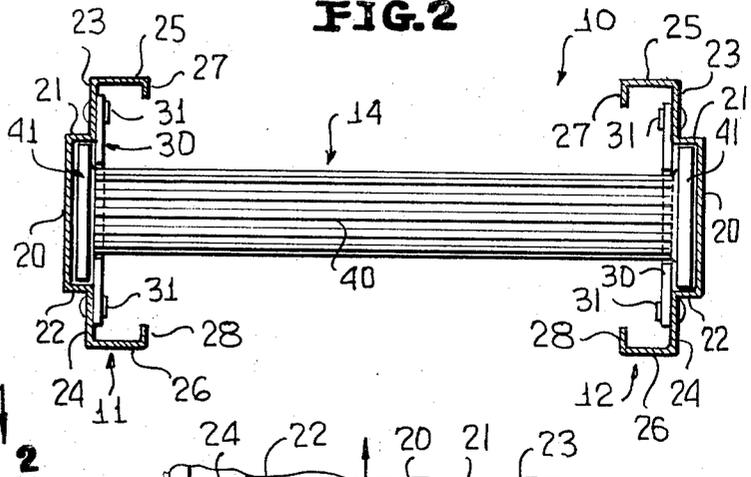


FIG. 3

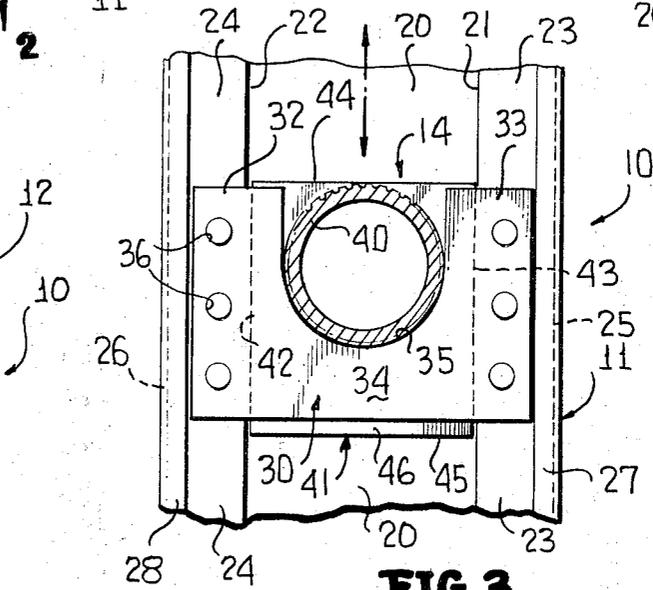
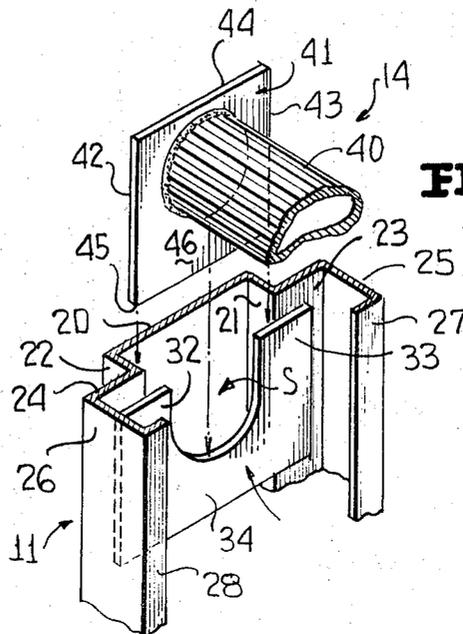


FIG. 4



KNOCKDOWN LADDER WITH REMOVABLE RUNGS

Conventional knockdown ladders have been known for many, many years and in most cases have been designed in an effort to achieve objectives such as, for example, ease of assembly, disassembly and use, lack of intricate design to reduce production cost and cost to consumers, and increased safety factors. Unfortunately, for the most part efforts have failed in at least one or more of the latter-noted categories and, accordingly, the present invention is directed to a novel knockdown ladder which is designed to achieve a totality of universal acceptance due to its ease of assembly, disassembly, use, etc., its reliability and more importantly safety, and the inexpensive nature thereof due to simplicity of design and assembly.

In keeping with the foregoing, the objective designed to be met by the present invention is that of providing a knockdown ladder which includes a pair of elongated side rails each carrying a plurality of plates secured to inboard sides thereof and being disposed in transverse alignment such that therebetween may be coupled a ladder rung within a notch of each plate and an upwardly opening slot defined between each plate and an associated side rail, the coupling arrangement being such that each ladder rung is provided at its ends with a rung plate receivable in the slot between the side rail plate and the side rail to maintain these components in assembled though knockdown relationship relative to each other.

A further object of this invention is to provide a novel knockdown ladder of the type heretofore defined wherein each side rail is of a generally U-shape configuration in transverse cross-section defined by a bight portion and a pair of leg portions with each side rail plate spanning the leg portions and defining therewith and with the bight portion each of the latter-noted slots, and in the set-up condition of the ladder the U-shaped side rails open in a direction toward each other.

Still another object of this invention is to provide a novel knockdown ladder of the type heretofore described wherein the side rail plates are of a generally U-shape configuration as viewed in side elevation and open upwardly whereby like contoured footrests of the ladder rungs may be received and supported thereby.

Still another object of this invention is to provide a novel knockdown ladder of the type heretofore described wherein the generally U-shaped configuration of the side rail notches further includes oppositely directed flange portions to which are secured the side rail plates.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claimed subject matter, and the several views illustrated in the accompanying drawing.

IN THE DRAWING

FIG. 1 is a perspective view of a novel knockdown ladder constructed in accordance with this invention, and illustrates a pair of identical side rails between which are coupled a plurality of identical ladder rungs.

FIG. 2 is an enlarged fragmentary sectional view taken generally along line 2—2 of FIG. 1, and illustrates the manner in which one of the identical ladder

rungs is couplingly secured between plates secured to each of the side rails.

FIG. 3 is an enlarged fragmentary sectional view taken generally along line 3—3 of FIG. 1, and more clearly illustrates the manner in which a ladder rung is releasably coupled to one of the side rails between the ladder and its associated plate.

FIG. 4 is a fragmentary perspective view partially in cross section of one of the side rails, the plate secured thereto, and a ladder rung and its plate, and illustrates the manner in which downward vertical motion of the ladder rung results in the assembly thereof to the associated side rail.

A novel knockdown ladder particularly adapted for use with a different number of rungs depending upon the particular height to which a person desires to climb is best illustrated in FIG. 1 of the drawing and is generally designated by the reference numeral 10. The knockdown ladder 10 includes a pair of identical side rails 11, 12 and a plurality of identical ladder rungs of which only six 14 through 18 are illustrated in FIG. 1. Preferably though not necessarily all the components 11 through 18 of the knockdown ladder 10 are constructed from aluminum or an aluminum-magnesium alloy in order that the ladder 10 is lightweight yet strong.

The side rails 11, 12 are of any standard length, as, for example, 8 feet, 10 feet, 12 feet or the like, and as best illustrated in FIG. 2 each side rail 11, 12 is of a generally U-shape configuration opening toward each other. Each side rail 11, 12 includes a bight portion 20 (FIG. 2), a pair of generally parallel leg portions 21, 22, oppositely directed flanges or flange portions 23, 24 generally parallel arm or arm portions 25, 26, and opposing terminal ends 27, 28. The leg portions 21, 22 and the arm portions 25, 26 are in generally parallel relationship to each other and are, of course, normal to the bight portion 20, the flange portions 23, 24, and the terminal ends 27, 28 of each of the side rails 11, 12.

A plurality of identical side rail plates each generally designated by the reference numeral 30 (FIG. 3) are secured preferably though not necessarily by rivets 31 (FIG. 2) to the flange portions 23, 24 of each of the side rails 11, 12. As is best illustrated in FIG. 3, each side rail plate 30 is of a generally U-shaped configuration as viewed in side elevation and is defined by a pair of legs 32, 33 and a bight portion 34 which collectively define a generally axially upwardly opening U-shaped notch 35. The legs 32, 33 have suitable apertures 36 through which pass the rivets 31 prior to being flattened in a conventional manner to secure the plates 30 to the side rails 11, 12. The flange portions 23, 24 of the side rails 11, 12 each have, of course, holes aligned with the holes 36 of the side rail plates 30. The side rail plates are secured to the side rails 11, 12 in suitable increments of elevation as, for example, 12 inches apart, and the side rail plates of one side rail are aligned transversely with those of the other side rail such that when the rungs 13 through 18 (or fewer or more) are coupled therebetween the same are disposed in a horizontal plane or more specifically normal to the side rails 11, 12.

Each of the ladder rungs 13 through 18 is identical and includes a tubular footrest 40 which is exteriorly axially grooved or otherwise roughened to increase the frictional purchase of anyone walking, stepping upon or standing upon the footrest 40 of the rungs 13

through 18. Opposite ends (unnumbered) of each footrest 40, which are preferably hollow to assure a lightweight construction, have welded thereto generally rectangular rung plates 41. The rung plates each includes side edges 42, 43, which are generally parallel to each other and are of a spaced apart distance corresponding to the distance between the leg portions 21, 22 (FIG. 2) of the side rails 11, 12. Each identical rung plate 41 further includes an upper edge 44 and a lower edge 45. It will be noted from FIGS. 3 and 4 that the footrest 40 is welded or otherwise secured to its associated rung plates 41 upwardly off-center more closely adjacent the edge 44 than the edge 45. The purpose of this construction is to provide each rung plate 41 with a downwardly directed projecting portion 46 which is designed for receipt behind the bight or bight portion 34 of its associated side rail plate 30, in the manner best shown in FIG. 3 of the drawings.

Reference is now made to FIG. 4 of the drawings which illustrates the rung 14 prior to being assembled or coupled to the side rail 11. The side rail 11 has been shown in cross section to clearly illustrate an upwardly opening slot S defined by the bight portion 20, the leg portions 21, 22, and portions of the legs 32, 33 and the bight 34 of the side rail plate 30. As was noted earlier, the width of the slot S as defined between the leg portions 21, 22 corresponds to the distance between the edges 42, 43 of the rung plate 41 of each of the rungs 13 through 18. Likewise, the depth or thickness of the plate 41 corresponds generally to the normal distance between the bight portion 20 of the side rail 11 and the plate 30. Thus, due to this dimensioning there is a relatively snug fit when any of the rungs 13 through 18 is assembled to any of the slots S of the side rails 11, 12. The assembly of any rung to its associate side rail or rails is achieved simply by aligning any of the rung plates 41 with and above any of the slots S and moving the same relative to one another such that the projecting portion 46 of each rung plate 41 descends into the slot S with guidance therefor being achieved by the latter-noted dimensioning of the leg portions 21, 22 of the side rail 11 and the edges 42, 43 of the rung plate 41. When fully seated (FIG. 1) the projection 46 is sandwiched between the bight 34 of the side rail plate 30 and the bight portion 20 of the side rail 11 and, of course, the footrest 40 is snugly housed within the contoured notch 35 of the side rail plate 30.

FIG. 1 represents a situation wherein the ladder 10 has a rung coupled between each transversely aligned pairs of the side rail plates 30, with three of the ladder rungs being omitted between the rungs 14 and 15 simply for convenience of illustration. However, the view shown in FIG. 1 of the ladder 10 may in fact be an actual working embodiment of the invention, as will be described more fully hereinafter.

Assuming that the side rails 11, 12 and rungs 13 through 18 (as well as others) of the knockdown ladder 10 are in disassembled condition, a person who is to use the ladder first determines precisely the elevation to which he desires to climb. If the distance is relatively low he may choose simply to place, for example, only four rungs in coupled spanning relationship between the side rails 11, 12. With this assumption he would first couple the rung 18 between the side rails 11, 12 in the manner described relative to FIG. 4 and proceed successively with the rungs 17, 16 and 15. The ladder would then be positioned adjacent the work area in

generally an upstanding position in the usual manner and the person would then climb the rungs 18 through 15 or any rung immediate thereto and perform the work which is to be done through the opening above the rung 15 and the portions of the side rails 11, 12 thereabove. In so working through the opening between the side rails 11, 12 there is assured a higher degree of safety than that conventionally achieved by standard conventional ladders when for the most part persons operate around or to either side of the side rails rather than between the side rails. However, even should the latter be done in conventional ladders the relatively close spacing of the rungs make operating difficult. However, in the present example there could be no other rungs above the rung 15 and therefore the entire area above the latter rung is open for ease of accessibility to the work area.

The same example might be extended somewhat to reduce flexure by adding the rung 14 and/or the rung 13 to the upper end of the ladder 10, and thereby keeping an open area between the rungs 14, 15 while at the same time regidifying the upper ends of the side rails 11, 12 due to the coupling thereof to each other through the rung or rungs 13 and/or 14.

As a final example, rungs identical to illustrated rungs 13 through 18 might be coupled between the three remaining opposing pairs of plates of the side rails 11, 12 such that the illustrated ladder 10 includes a totality of nine rungs. Thus in the illustrated embodiment of the invention any number of rungs from 9 to as low as one may be utilized and the spacing between any two or more may be varied as desired with the only limitation being the distance between adjacent ones of the side rail plates 30 along the length of the side rails 11, 12.

Another advantage of the ladder 10 is in conjunction with its use in scaffolding. As an example, assuming that the ladder 10 has but five rungs coupled thereto, as shown in FIG. 1, and another ladder is identically assembled, a platform or the like may be positioned to span the rungs 15, 15 of both ladders 10. Normally the end of such platforms have U-shaped hooks which open downwardly and snugly rest upon the footrests 40. The result is a relatively rigid scaffold but, of more importance, the relatively greater opening than normal between the rungs 14, 15 provides an area through which a workman may pass when climbing to or from the scaffold, as opposed to the conventional practice of swinging one's body about the outside of either the side rails 11, 12 which is, of course, a highly dangerous practice.

While preferred forms and arrangements of parts have been shown in illustrating the invention, it is to be clearly understood that various changes in detail and arrangement of parts may be made without departing from the spirit and scope of this disclosure.

I claim:

1. A knockdown ladder particularly adapted for use with a different number of rungs depending upon the particular height to which a person desires to climb comprising a pair of elongated side rails adapted when in use to be disposed in an upright position, a plurality of plates secured to opposing inboard sides of each side rail, the plurality of plates being disposed in transversely aligned pairs along the length of said side rails with each pair being adapted to couplingly support therebetween a ladder rung, each plate having an up-

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wardly opening notch and with its associated side rail defining an upwardly opening slot, a plurality of ladder rungs, a plate secured to each ladder rung at opposite ends thereof, and said rung and rung plates being con-
toured to the general shape of said notches and slots re-
spectively whereby downward movement of each lad-
der rung relative to the side rails and any transversely
opposite side rail plates results in the reception of said
rung plates into the associated slots and the reception
of said ladder rung into the associated notches.

2. The knockdown ladder as defined in claim 1 wherein said side rails are of a U-shaped configuration in transverse cross section defined by a bight portion and a pair of leg portions, each side rail plate spans said leg portions and defines therewith and with said bight
portion each of said slots, and in the set-up condition
of said ladder and U-shaped side rails open in a direc-
tion toward each other.

3. The knockdown ladder as defined in claim 1 wherein said side rail plates are of a generally U-shaped
configuration as viewed in side elevation.

4. The knockdown ladder as defined in claim 1 wherein said side rails are of a U-shaped configuration

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in transverse cross section defined by a bight portion and a pair of leg portions having oppositely directed flange portions, each side rail plate spans said leg portions and defines therewith and with said bight portion
each of said slots, means securing each side rail plate
to the flange portions of its associated side rail, and in
the set-up condition of said ladder said U-shaped side
rails open in a direction toward each other.

5. The knockdown ladder as defined in claim 1 wherein said side rails are of a U-shaped configuration in transverse cross-section defined by a bight portion and a pair of leg portions having oppositely directed flange portions, generally parallel arm portions connected to said flange portions and opposing terminal ends extending towards each other, each side rail plate spans said leg portions and defines therewith and with
said bight portion each of said slots, means securing
each side rail plate to the flange portions of its associ-
ated side rail, and in the set-up condition of said ladder
said U-shaped side rails open in a direction toward each
other.

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