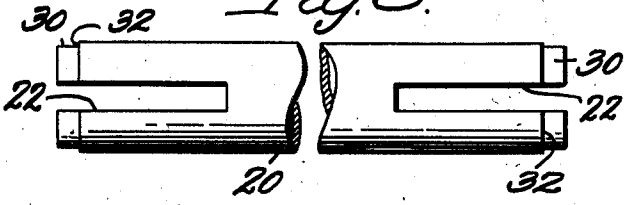
Dec. 15, 1942. H. ST. PIERRE 2,304,955

EMBARKATION LADDER CONSTRUCTION

Filed April 21, 1942

Fig. 3.



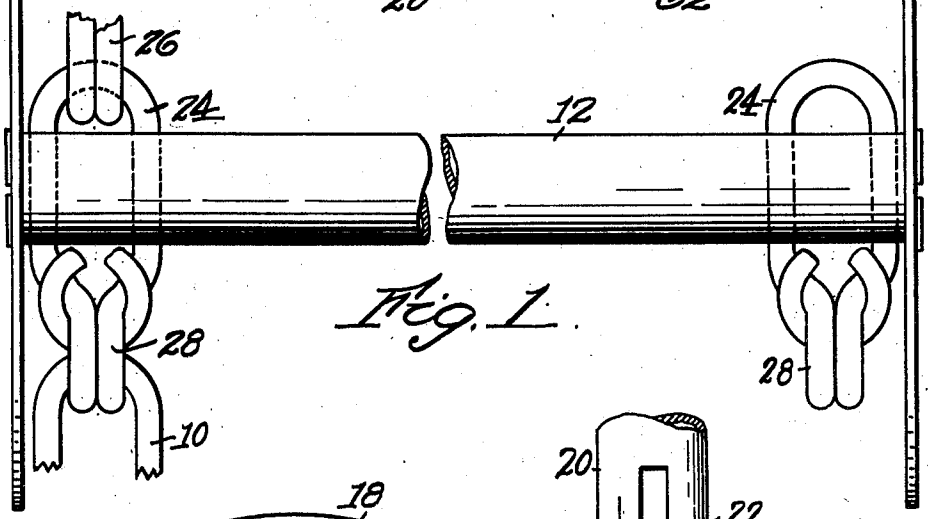


Fig. 1.

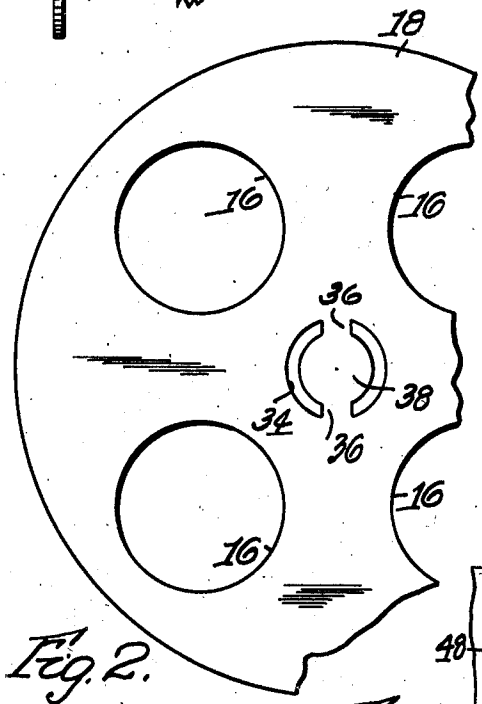


Fig. 2.

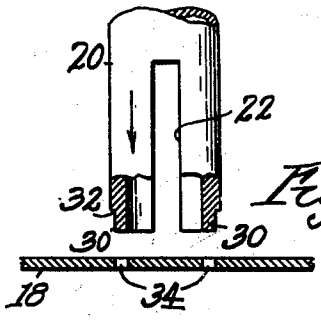


Fig. 4

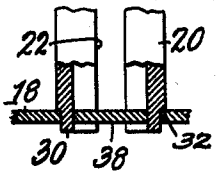


Fig. 5.

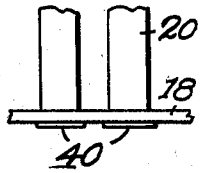


Fig. 6.

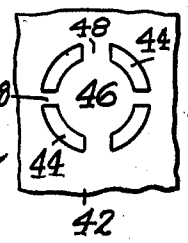


Fig. 7.

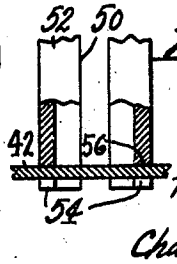


Fig. 8.

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EMBARKATION LADDER CONSTRUCTION

Henry St. Pierre, Worcester, Mass.

Application April 21, 1942, Serial No. 439,921

13 Claims. (Cl. 228—40)

This invention relates to embarkation ladder constructions and specifically to means for improving the connections between the rungs and the toe plates.

Objects of the invention include the provision of means to connect and maintain the rungs of the ladder and the toe plates in fixed rigid condition, and to arrange the same to prevent tangling or snarling of the side chains; the provision of an embarkation ladder comprising side chains, rungs, and toe plates attached to the rungs and extending laterally of the rungs to prevent contact of the latter with a ship's side so as to provide room for the toes in scaling the ladder, wherein the ends of the rungs are slotted for the reception of the side chains, and wherein means is provided at the rung ends for locating the toe plates in right angular condition with respect to the rungs, and means for preventing rotation or endwise play of the toe plates on the rungs; the provision of a chain ladder having toe plates at the ends of the rungs, said toe plates being apertured for lightness, and means to rigidly connect the toe plates to the rungs in a manner to prevent endwise or rotative play of the toe plates on the rungs, said means also being effective to position the toe plates relative to the chains so that the latter coincide with a solid portion of the former in use of the ladder, whereby the links of the chain are prevented from entanglement with the toe plates or entry into the toe plate apertures.

Other objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawing, in which

Fig. 1 is a view in front elevation of a part of an embarkation ladder embodying one form of the invention;

Fig 2 is a side view of a toe plate with parts broken away;

Fig. 3 is an elevation of a ladder rung;

Figs. 4 and 5 are detail views illustrating the assembly of the rung and toe plate, the side chain being omitted;

Fig. 6 shows the toe plate and rung assembled; and

Figs. 7 and 8 illustrate a modified form of the invention.

The usual navy embarkation ladder comprises a pair of side chains such as illustrated at 10, a metal rung 12, and a pair of end toe plates similar to those shown at 14, secured to the ends of the rung. Heretofore these toe plates have been assembled in such a way that they could rotate on the rung as an axle, and they were also capable of endwise movement on the rung. For these reasons, the ladders have not been as safe as desired because the links of the chain could become entangled in openings such as at 16 in my novel toe plate 18, and not only was time wasted in distentangling the ladder chains, but an actual hazard was present in the use of the ladders. It is clear that these ladders should be as safe as possible due to their use at sea under difficult conditions, and the present invention provides means for preventing the play of the toe pieces on the rungs and also for preventing the side chain entanglement.

Referring to Fig. 3, a new and improved ladder rung is shown comprising a tube 20 longitudinally slotted at its ends at 22 to receive link 24 of the side chains 10. Slots 22 are located in the same plane to provide for correct alignment of the chains, and as shown in Fig. 1, the links 24 extend through the slots 22 and are longitudinally anchored by reason of the bent connecting portions 26 of the next adjacent links and by their own bent connections 28. The tubular rung 20 is provided with circular relieved portions or arced lugs 30 forming circular shoulders 32 which act as stops for the toe plates 18.

Toe plates 18 are circular and centrally thereof are provided with punched concentric arc-shaped apertures 34 to fit the relieved portions 30 of the rungs. Apertures 34 are separated at their ends by solid portions 36 of the plates, and the distance between the ends of the apertures corresponds to the width of slots 22. A center line of portions 36 coincides with a centerline between apertures 16 in plates 18 for a purpose to be described. The centers 38 of plates 18, contained within the apertures 34, are solid and connected to the portions 36 as shown, and these center just fit the inside diameters of the rungs.

To assemble a ladder, links 24 are thrust endwise into slots 22 in the rung, and plates 18 are then slid onto the rung relieved portions or lugs 30, as in Figs. 4 and 5. The extending ends of lugs 30 are seen to project beyond the plate which comes to rest on and is positively stopped by shoulders 32. Also portions 36 of the plates provide a stop against the ends of relieved portions 30 to ensure against rotary motion of the plates on the rungs, and therefore the plates 18 are positively locked with relation to the rungs and chains.

It will be seen that when a ladder of the type described is lowered over a ship's side, the chains will be aligned with the plate portions 36 and will

necessarily extend along a center line between vertical pairs of plate apertures 16, or in other words, in Fig. 2, the chains will be constrained to a vertical line through the diametrical centers of plates 18 as seen in Fig. 2. Hence any kinked links of the chains do not come opposite the plate apertures, but will encounter only solid portions of the plates, and therefore the chain links cannot enter the apertures in the plates and cause dangerous mis-aligned rungs in the suspended ladder. This relation of toe plates to rungs and chains is rigidly fixed by the construction described, and there is no possibility of any change in this relation due to the interlocking of the rungs and plates, this interlocking clearly being based on the slots 22 which automatically ensures correct application of the plates to the rungs and correct alignment of the chains and the solid portions of the toe plates.

As shown in Fig. 6, the extending ends of lugs 30 are peened over as at 40 to prevent disassembly of the parts, and therefore the toe plates 18, chain links 24, and rungs 20 are all permanently locked together in a rigidly fixed relation.

A modified form of connection is shown in Figs. 7 and 8 wherein a toe plate 42, which may have apertures 16 also, is punched with four arc-shaped apertures 44 all circularly disposed about a solid plate center 46 corresponding to the plate center 38 in Fig. 2. This arrangement provides for four solid plate portions 48 between the ends of the apertures 44, two diametricaly opposite portions 48 fitting chain slot 50 in tubular rung 52 and the other two diametrically opposite portions 48 fitting in slots 54 which lie at 90° to slot 50. Slots 54 are of a depth a little greater than the thickness of the toe plate to provide stops 56 for the plate, and all four of the rung lugs formed by slots 50 and 54 may therefore be peened over on the plate to lock it. This construction obtains the results of the construction of Figs. 1–6, since the chain slot 50 and its corresponding solid plate portions 48 may be made of a different width from the portions 48 fitting slots 54, and thus the fixed relation of plate, rung, and chain links 24 may be easily achieved in assembly and maintained in use.

Having thus described my invention and the advantages thereof, I do not wish to be limited to the details herein disclosed, otherwise than as set forth in the claims, but what I claim is:

1. A ladder comprising a tubular rung, longitudinal diametrical slots in said rung at its ends, said slots extending inwardly toward each other from said ends and being located in the same plane; side chains, a link of each chain disposed in a slot, and toe plates connected one to each end of the rung outwardly of the chains, said toe plates each comprising a flat disk, arc shaped apertures in said disk adjacent its center, said apertures being formed to the shape of the tubular rung and receiving the same, said apertures being spaced a distance corresponding to the width of one of said slots, the material of said disk between apertures fitting said one slot and the inner diameter of said tubular rung, means on said rung intermediate the ends of said one slot to stop said disk and hold it against movement in one direction along the rung, and means on said rung for securing the disk against said first named means.

2. A ladder as recited in claim 1 wherein the first named means comprises a shoulder.

3. A ladder as recited in claim 1 wherein said first named means comprises a peripheral shoulder on said rung.

4. A ladder as recited in claim 1 wherein said first named means comprises a shoulder on the exterior periphery of said rung.

5. A ladder as recited in claim 1 wherein said first named means comprises a peripheral recess in said rung at its end, said recess forming a shoulder with said rung at its inwardmost extent longitudinally of the rung.

6. A ladder as recited in claim 1 wherein said first named means comprises a longitudinal slot in said rung at its end, said last named slot being shorter than the first named slot, the bottom of the last named slot forming a shoulder.

7. A ladder as recited in claim 1 wherein said first named means comprises a pair of relatively short slots in the end of the rung and arranged longitudinally thereof; said slots being spaced about the periphery of the rung.

8. In a chain ladder having tubular rungs and toe plates secured to the rungs, that improvement which comprises interengaging means on the toe plates and rungs rigidly holding them against relative rotative or endwise movement, said means including a slot in the rung, a shoulder on the rung adjacent the slot, apertures in said plate to receive the rung in an endwise manner, said shoulder stopping said plate, a portion of said plate entering said slot, and means securing the plate against the shoulder.

9. A chain ladder having tubular rungs and toe plates secured to the rungs, the toe plates being provided with apertures for the purpose of lightening their weight, said apertures being spaced to provide diametrically opposite solid areas in the plates between pairs of apertures. further apertures in said toe plates adjacent the centers thereof, said further apertures being formed on curves to receive the ends of the rungs lengthwise thereof, solid portions between said further apertures aligned with said solid areas, and longitudinal slots in the ends of the rungs for receiving said solid portions, whereby links of the chains may be received in said slots and held therein parallel to said plate solid areas for the purpose described.

10. A chain ladder as recited in claim 10 wherein said rungs are provided with stop means to locate the toe plates lengthwise of the rungs.

11. A chain ladder as recited in claim 10 wherein said rungs are provided with additional slots the bottoms of which form stop shoulders for the solid portions of the toe plates.

12. A chain ladder as recited in claim 10 wherein said rungs are provided with peripheral recesses forming stop shoulders for engaging solid portions of said plates to locate the same.

13. An embarkation ladder comprising tubular rungs, slots in the rungs, side chains, certain links of the side chains being received in said slots, toe plates secured to said rungs outwardly of the links to hold them against endwise escape, and interengaging means on said rungs and toe plates maintaining them against relative rotation or movement longitudinally of the rungs, said means comprising shoulders on said rungs located intermediate the ends of the slots, said shoulders being located substantially transversely of the axes of the rungs, means on the toe plates entering said slots, and portions of said toe plates engaging the shoulders and being stopped thereby.

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