April 29, 1952 J. HUCK 2,594,561

LADDER OF LIGHTWEIGHT METALS

Filed June 3, 1948

Fig. 1.

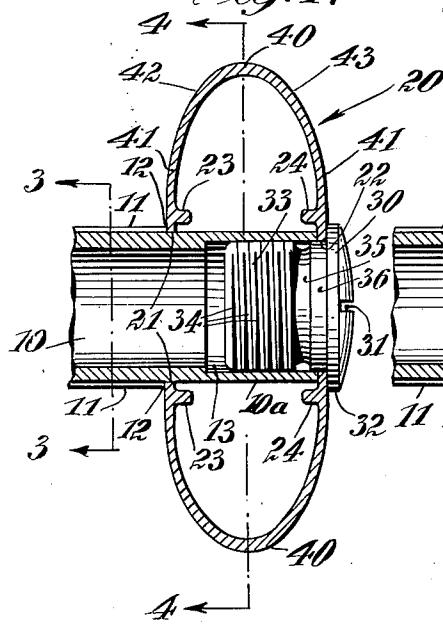


Fig. 2.

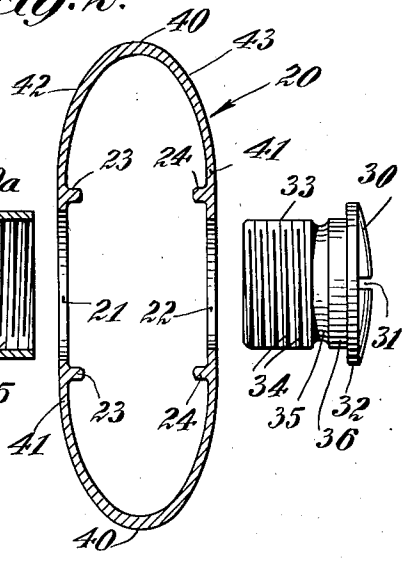


Fig. 3.

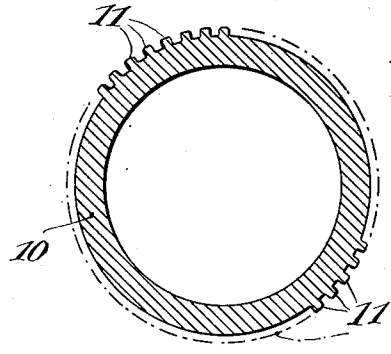
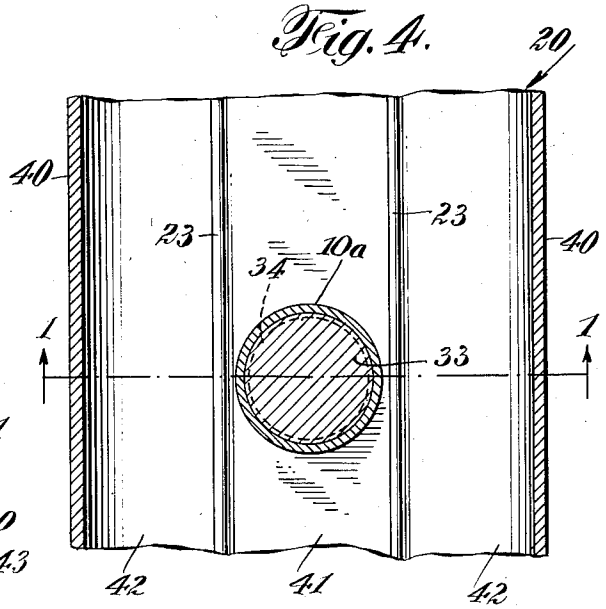


Fig. 4.



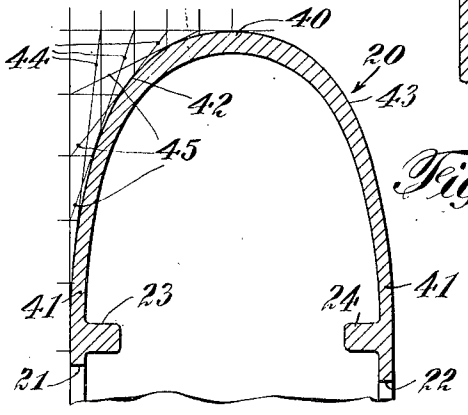


Fig. 5.

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LADDER OF LIGHTWEIGHT METALS

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2 Claims. (Cl. 228—58)

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This invention relates to ladders and more particularly to ladders of the light weight metal type.

Ladders of this type present special problems, since the advantage gained by utilizing a light weight metal, is accompanied with lack of resisting strength. The invention contemplates means for strengthening the rails of a ladder to give it resistant strength, and consists in making the rails in horizontal cross-section of general lentil shape with thickened peripheral portions and of general parabolic contour with longitudinal internally extending ribs at their central portion. The invention consists further in a novel rung having its rilled end cut off to form a smooth cylindrical exterior having a shoulder to abut against the inner wall of the rail, said cylindrical portion having its bore internally screwthreaded, and having its end abut against the outer wall of the rail, said bore being engaged by a screw threaded shaft having a collar within the bore and within the outer wall of the rail and having a flange exterior to the rail, to press the flange against the rail, to have the collar act as an aligner to the bore and to the rail, and to provide a secure non-rattling connection between rung and rail.

The invention consists also in the combination of the special form of rung with its headed shaft, producing a novel result by the coaction of the characteristic features described.

As ladders of this general type are known, the drawings present only the novel unit of rung and rail, without showing a multiplicity of the same.

The invention will be more fully described hereinafter, embodiments thereof shown in the drawings, and the invention will be finally pointed out in the claims.

In the accompanying drawings,

Fig. 1 is a horizontal section of a ladder rail with a rung applied thereto in accordance with the invention, the section being taken corresponding to line 1—1 of Fig. 4.

Fig. 2 is an exploded view of Fig. 1;

Fig. 3 is a section taken on line 3—3 of Fig. 1;

Fig. 4 is a section taken on line 4—4 of Fig. 1; and

Fig. 5 is a diagrammatic drawing showing the parabolic shape of the rail, and the thickened end part of the same.

Similar characters of reference indicate corresponding parts throughout the various views.

Referring to the drawings, a hollow rung 10 is provided with rills 11 longitudinally thereof.

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These rills 11 are cut off to form a shoulder 12, leaving the outer end of the rung 10 of smooth cylindrical exterior. The hollow rung 10 is bored out to form a bore 13 and internal shoulder 14, and the bore has internal screw threads 15.

The ladder rail 20 is of general lentil shape in horizontal cross-section, and has central openings 21 and 22. The opening 21 has a larger diameter than that of the opening 22. It is hollow and has longitudinal flanges 23 and 24, in proximity to the walls forming the openings 21 and 22. These flanges or internal ribs are for strengthening the shell like rail.

The diameter of the opening 21 is substantially equal to the outer diameter of the cylindrical unrilled part 10a of the rung 10, and the exterior surface of the rail abuts against the shoulder 12 of the rung 10. The other side of the rail 20 (the outer side) which has the opening 22 of smaller diameter than that of the opening 21, has its interior surface abut against the tip end of the unrilled part 10a of the rung 10, and the inner surface of the bore 13 and the wall of the opening 22 are aligned.

A screw locking unit 30 with a tool slot 31, and flange 32 of a diameter larger than the outer diameter of the part 10a, has a shaft portion 33 with external screw-threads 34 meshing with the internal screw threads 15 of the bore 13, and when screwed home locks the rail 20 and rung 10 securely together.

Disposed between the screwthreaded portion 34 and the flange 30 is a circumferential ring or circular shaped cutout 35 and an adjacent cylindrical collar 36 having an outer diameter substantially equal to the inner diameter of the bore 13 to provide a seating portion for the wall of the opening 22 and to extend a contacting distance into the bore 13 to provide a tight, that is, unrattling connection for the coacting parts.

The external and internal contour of the rail is important. These contours are such that the peripheral portion 40 of the rail 20 has a greater thickness than the leg portions 41. The two parts 42 and 43 forming the peripheral portion 40 are each of parabolic shape as shown by the lines 44 and 45, which gives to the thickened portion a structure of great strength. This is important, since the material used is aluminum, or magnesium. The rails are made preferably by the extrusion process, after which the openings 21 and 22 are provided therein.

The contour of the rail tube is oblong with rounded ends, or elliptic, and thus has a major and minor axis. The openings 21 and 22 are

co-axial with the minor axis. At the major axis, the thickness of the tube is greatest, and this thickness diminishes towards the minor axis. This diminishing thickness may continue to the wall of the openings 21 and 22, or terminate before, from which point the inner and outer walls could have uniform thickness as shown in the drawings. This, on the one hand, gives ample strength, and on the other hand, effects a swing in the cost of material.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

I claim:

1. In a ladder of light weight metal, the combination of a rail of general lentil shape contour having central openings, one opening being of larger diameter than the other opening, a hollow rung having an outer diameter corresponding to the larger diameter of the opening of the rail, and having an end abutting against the inner surface of the wall having the other opening, and a flanged shaft engaging the bore of the rung, and having its flange abut against the outer surface of rail at the smaller diameter opening, said bore being internally screwthreaded and said shaft being externally screwthreaded, said shaft having a collar engaging the wall of the rung bore and the wall forming the smaller diameter opening of the rail shell, and said rung having an external shoulder abutting against the outer surface of the wall of the rail shell having the larger diameter opening.

2. In a ladder of light weight metal, such as aluminum or magnesium, a structural rail member including a hollow rail tube having in horizontal cross section an elliptic exterior and interior contour, of general exterior and interior

lentil shape, throughout the length of the rail member, each lateral half of said contour having outer and inner surfaces spaced from each other the greatest distance along the major axis of said contour and diminishing in said spacing towards the minor axis, and internal integral flanges extending inwardly of said interior contour parallel with said minor axis, one pair of such flanges being at each side of said minor axis, said flanges extending continuously and longitudinally of the interior of the rail tube from end to end thereof, said tube having pairs of spaced registering openings coaxial with the minor axis of said rail tube with the diameter of one opening larger than that of the other opening, the diameter of said openings being smaller than the distance between two of said continuous flanges parallel with the major axis.

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