

July 28, 1964

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3,142,356

LADDER CONSTRUCTION

Filed Aug. 2, 1963

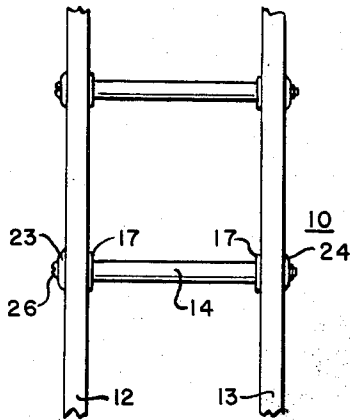


FIG. 1

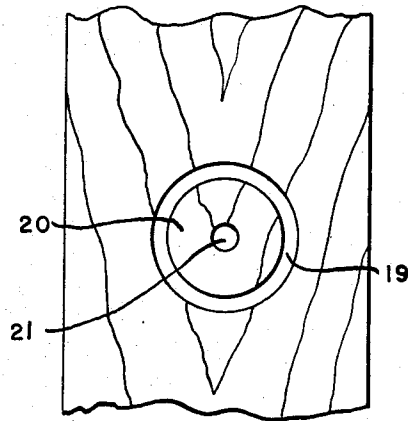


FIG. 2

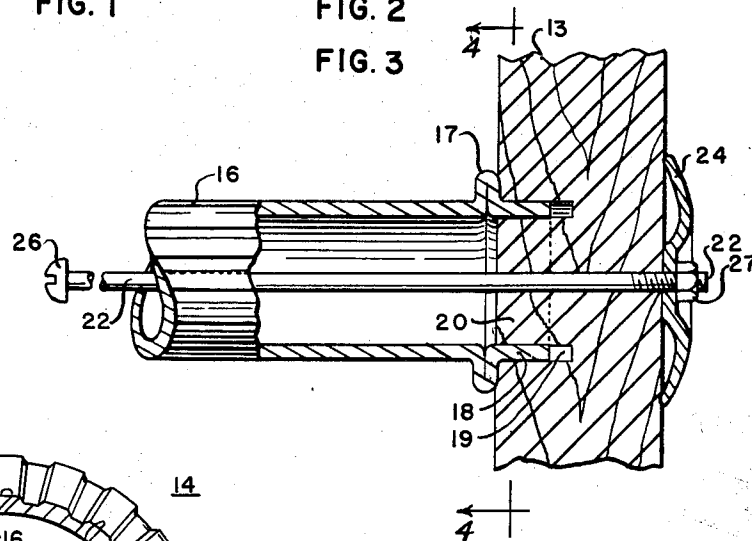


FIG. 3

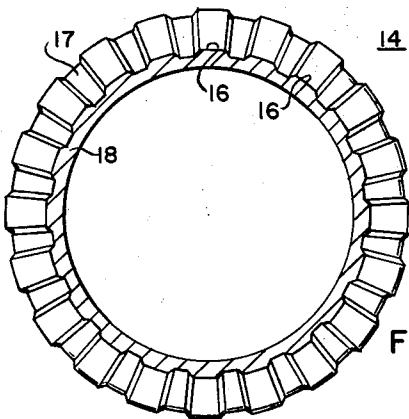


FIG. 4

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LADDER CONSTRUCTION

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Filed Aug. 2, 1963, Ser. No. 299,595
6 Claims. (Cl. 182-194)

This invention relates to ladders, and, more particularly, this invention relates to an improved construction for a section of an extension ladder or the like.

An object of this invention is to provide a strong stable ladder having wooden rails and tubular metal rungs.

A further object of this invention is to provide a ladder of this type in which the ends of the rungs are seated in recesses in the side rails and in which plugs inside the recesses in the side rails and integral with the side rails substantially fill the ends of the rungs.

A further object of this invention is to provide a ladder of this type in which outwardly extending flanges or beads on the rungs engage inner faces of the rails and are drawn thereagainst by rods extending centrally of the rungs so that the rungs are precisely positioned with respect to the rails.

A further object of this invention is to provide a ladder of this type in which the rungs are formed of metal having ribs extending therealong and in which the ribs extend along the flanges to engage the rungs to lock the rungs against turning with respect to the rails.

The above and other objects and features of the invention will in part be apparent and in part be obvious to those skilled in the art to which this invention pertains, from the following detailed description, and the drawing, in which:

FIG. 1 is a view in side elevation showing a portion of a ladder section constructed in accordance with an embodiment of this invention;

FIG. 2 is an enlarged fragmentary view in side elevation of an inside face of a portion of one of the side rails of the ladder section removed from the ladder;

FIG. 3 is a fragmentary view in section showing a portion of one of the rungs and a portion of one of the side rails of the ladder; and

FIG. 4 is a view in section taken on the line 4-4 in FIG. 3 showing one of the rungs removed from the ladder.

In the following detailed description, and the drawing, like reference characters indicate like parts.

In FIG. 1 is shown a ladder section 10 having wood side rails 12 and 13. The side rails 12 and 13 are spanned by rungs 14. As shown in FIG. 3, each of the rungs 14 is formed of metal tubing. The surface of each rung 14 is provided with ribs 16 to prevent slipping. The material of the rung adjacent each side rail is outwardly extended to form return bend portions or flanges 17 which engage the rungs. End portions 18 of the rungs extend into annular sockets or slots 19 in the rungs.

As shown in FIG. 2, the annular socket 19 is formed in the rung with a plug 20 being retained therein. A central bore 21 is formed in the plug 20. As already indicated, the end portion 18 (FIG. 3) of the rung is received in the annular socket, and the plug supports the interior wall of the rung.

The side rails 12 and 13 and rungs 14 are held in rigidly assembled relation by means of tension rods 22 (FIG. 3). Each rung is provided with a tension rod 22 which extends axially through the rungs and through the side rails 12 and 13. As shown in FIG. 3, the tension rod 22 extends through the bore 21 in rail 13 coaxially with the plug 20. Washers 23 and 24 (FIG. 1) are received on the tension rod and engage the outer faces of the rails 12 and 13, respectively. A head 26 at one end of the tension rod 22 engages the washer 23.

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A nut 27 threaded on the other end of the tension rod 22 engages the washer 24. When the nut 27 and similar nuts on the other tension rods are drawn up tightly on the threaded ends of the rods, the rods are held firmly against the ends of the rungs so that the rungs are held in compression and the rails and rungs are firmly secured together.

The rungs may be formed of any suitable sturdy material. Preferably, the rungs are formed of aluminum or magnesium. Since the rails are of wood, there is no conductivity of electricity along the ladder and no hazard of hands freezing to rails in cold weather. The ribs 16 on the rungs extend around the return bend flanges 17 and extend radially outwardly thereof as shown most clearly in FIG. 4; and the portions of the ribs on the flanges opposed to the rails are held firmly against the wood of the side rails to lock the rungs against turning.

The ladder section illustrated in the drawing and described above is subject to structural modification without departing from the spirit and scope of the appended claims.

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

1. A ladder which comprises a pair of elongated spaced rails, a plurality of tubular rungs spanning the rails, the rails having annular sockets of substantial depth on their inside faces, each annular socket having a plug in fixed relation to the rail and coaxial with the socket, end portions of the rungs being received in said annular sockets, there being outwardly extending return bent flanges on each rung engaging inner faces of the rails, there being ribs extending lengthwise of the rungs, the ends of the rungs when received in such sockets being substantially filled by said plugs and means for drawing the rails toward each other to cause the rails to engage the return bent flanges to brace the ladder against rack and limit advance of ends of the rungs into said sockets and frictionally lock the rungs against turning relative to the rails.

2. A ladder which comprises a pair of elongated spaced wood rails, a plurality of tubular metal rungs spanning the rails, the rails having annular sockets of substantial depth on their inside faces, each annular socket having a plug integral with the rail and coaxial with the socket, end portions of the rungs being received in said annular sockets, there being outwardly extending return bent flanges on each rung engaging inner faces of the rails, there being ribs extending lengthwise of the rungs and radially outwardly along said flanges, there being a tension rod receiving bore through each rail in substantially the center of each plug, the ends of the rungs being substantially filled by said plugs, a tension rod extending through each of the rungs and through the bores in the plugs of the rails associated therewith, and means on the ends of the tension rods engaging outer faces of the rails for drawing the rails toward each other to cause the rails to engage the return bent flanges, whereby the ribs on the return bent flanges engage the rails and lock the rungs against turning, the tension rods and the ends of the rungs substantially filling the rod-receiving bores and annular openings in the rails, respectively.

3. A ladder which comprises a pair of elongated spaced rails, a plurality of tubular rungs spanning the rails, the rails having annular sockets of substantial depth on their inside faces, each annular socket having a plug integral with the rail and coaxial with the socket, end portions of the rungs being received in said annular sockets, there being outwardly extending return bent flanges on each rung engaging inner faces of the rails, there being ribs extending lengthwise of the rungs and radially outwardly along said flanges, the ends of the rungs when received in such sockets, being substantially filled by said plugs, and means for drawing the rails toward each other to

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cause the rails to engage the return bent flanges, whereby the ribs on the return bent flanges engage the rails and lock the rungs against turning.

4. A ladder which comprises a pair of elongated spaced rails, a plurality of tubular rungs spanning the rails, the rails having annular sockets of substantial depth on their inside faces, each annular socket having a plug integral with the rail and coaxial with the socket, end portions of the rungs being received in said annular sockets, there being outwardly extending, return bent flanges on each rung engaging inner faces of the rails, there being ribs extending lengthwise of the rungs and radially outwardly along said flanges, there being a tension rod receiving bore through each rail at each plug, the ends of the rungs when received in such sockets, being substantially filled by said plugs, a tension rod extending through each of the rungs and through the bores in the plugs of the rails associated therewith, and means on the ends of the tension rods engaging the rails for drawing the rails toward each other to cause the rails to engage the return bent flanges, whereby the ribs on the return bent flanges engage the rails and lock the rungs against turning.

5. A ladder which comprises a pair of elongated spaced wood rails, a plurality of tubular metal rungs spanning the rails, the rails having annular sockets of substantial depth on their inside faces, each annular socket having a plug integral with the rail and coaxial with the socket, end portions of the rungs being received in said annular sockets, there being outwardly extending, return bent flanges on each rung engaging inner faces of the rails, there being ribs extending lengthwise of the rungs and radially outwardly along said flanges, there being a tension rod receiving bore through each rail of each plug, a tension rod extending through each of the rungs and through the bores in the plugs of the rails associated therewith, the end portions of the rungs terminating short of the inner ends of the sockets and means on the ends

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of the tension rods engaging outer faces of the rails for drawing the rails toward each other to cause the rails to engage the return bent flanges, whereby the ribs on the return bent flanges engage the rails and lock the rungs against turning.

6. A ladder which comprises a pair of elongated spaced wood rails, a plurality of tubular metal rungs spanning the rails, the rails having sockets of substantial depth on their inside faces, each socket having a plug in fixed relation to the rail and centered in the socket, end portions of the rungs being received in said sockets, there being outwardly extending, return bent flanges on each rung engaging inner faces of the rails, there being ribs extending lengthwise of the rungs and radially outwardly along said flanges, there being a tension rod receiving bore through each rail at each plug, a tension rod extending through each of the rungs and through the bores in the plugs of the rails associated therewith, the end portions of the rungs terminating short of inner ends of the sockets and means on the ends of the tension rods engaging outer faces of the rails for drawing the rails toward each other to cause the rails to engage the return bent flanges, whereby the ribs on the return bent flanges engage the rails and lock the rungs against turning.

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