Oct. 10, 1950 S. JASPER 2,525,412

TENSIONING DEVICE FOR STEP LADDERS

Filed July 26, 1947

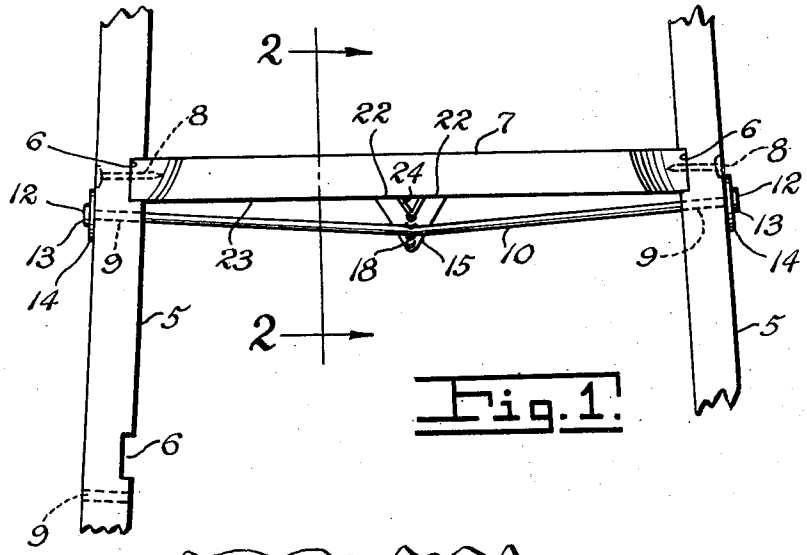


Fig. 1.

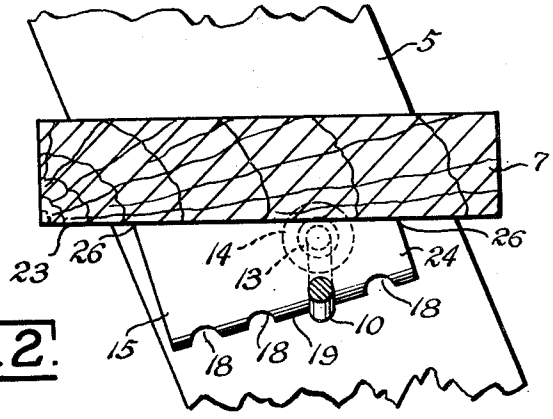


Fig. 2.

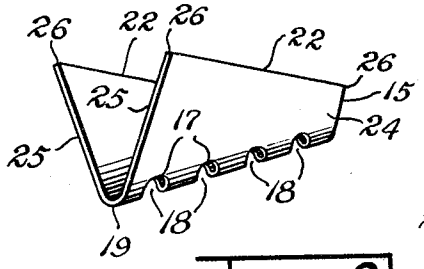


Fig. 3.

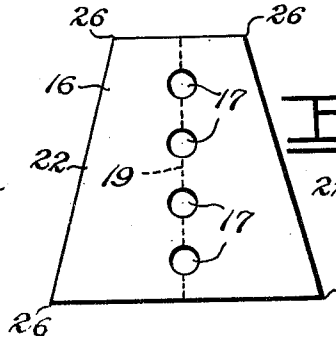


Fig. 4.

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Patented Oct. 10, 1950 2,525,412

UNITED STATES PATENT OFFICE

2,525,412

TENSIONING DEVICE FOR STEP LADDERS

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Application July 26, 1947, Serial No. 763,909

4 Claims. (Cl. 228—59)

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This invention relates to step ladders and particularly to an improvement in reinforcing the connections of the steps or treads thereof with the side rails or stiles.

One of the objects of the invention is to provide a simple and inexpensive means for imparting rigidity and strength to a step ladder from time to time, as may be required.

Another object is the provision of a truss construction whereby sagging or rocking of a ladder step is effectively precluded.

A further object is the provision of an adjustable block or wedge adapted to meet varying tensioning conditions that develop incident to the assembly of the ladder parts and to shrinkage after a period of use.

Another object of the invention is the provision of a tensioning wedge of a nature that requires no anchorage means to preclude displacement.

These and other objects and advantages are attained by the means described in the following specification, and illustrated upon the accompanying drawings, in which:

Fig. 1 is a fragmental front elevational view of a step ladder embodying the device of the invention.

Fig. 2 is an enlarged cross-sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is an enlarged perspective view of the tensioning wedge or block.

Fig. 4 is a developed view of the wedge or block.

In the past, wedge members for tensioning the truss rods of step ladders have generally been fabricated of wood, which construction required the use of a nail or other anchorage means for precluding displacement of the wooden wedge member. In such cases, the wooden wedge could not be readily adjusted to take up any slack that might develop in the truss rod by reason of shrinkage in the step and stile members after a period of use; and because of the effort required and the inconvenience encountered in making the adjustment, few users of ladders were inclined to maintain them in a safe and rigid condition.

As will presently be shown, the device of the present invention obviates these objectionable limitations. This device is readily adjustable at will, and its construction is such that it bites into or grips the material of the step member, thus eliminating the necessity of additional anchorage means.

Referring to Fig. 1, the divergent stiles or side rails 5 of a step ladder are generally provided

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with mortises or gains 6 at the inner sides thereof in spaced parallelism to receive step members 7. In order to preclude transverse movement of the steps 7 relative to the stiles or side rails 5, anchorage means, such as nails 8, may be driven through the side rails and into the ends of the step members.

The side rails or stiles 5 are provided with apertures 9, immediately beneath each mortise 6, for the insertion therethrough of truss rods 10, which serve to connect or tie the ends of the steps 7 to the stiles 5. The projecting truss rod ends 12 are riveted or headed, as at 13, to prevent displacement. A washer 14 may be interposed between the truss rod heads 13 and the side rails or stiles 5 in order to preclude the possibility of the heads 13 pulling through the stiles upon application of tension to the truss rods 10.

By means of a wedge or block 15, shown in detail in Fig. 3, the truss rod 10 is tensioned to provide a secure binding or tying together of the ladder parts. The wedge member 15 is bent into a substantial V shape, from an isosceles trapezoid 16, Fig. 4, of medium gage sheet metal, provided with a series of spaced apertures 17 upon its median line 19. When the isosceles trapezoid 16 is bent upon the median line 19, the apertures 17 provide a series of open seats or pockets 18, along the lower edge or apex of the V-shaped wedge 15, said seats being at progressively increased distances from the step contacting edges or base edges 22 of the wedge.

In practice, the step ladder is assembled by nailing the steps in position between the stiles, and thereafter applying and tensioning the truss rods to some degree, at least. A prying implement or lever of any suitable type may then be projected between a step and its reinforcing truss rod, at a location near the middle point of the rod, and with proper manipulation of the implement the truss rod may be forced away from the step a sufficient distance to permit easy placement of the wedge as previously explained. The base edges 22 of the wedge rest firmly upon the step face 23, and slippage at this location is precluded by reason of the fact that the inner corners of the edges 22 are unfinished and will usually carry burrs that tend to increase the coefficient of friction upon the wooden step face. The several corner points 26 may be left sharp and unfinished, to augment the desired gripping action previously referred to. The apex of the wedge, on the other hand, preferably is rounded, rather than sharpened, to conserve the strength of the metal and facilitate insertion of the wedge

beneath the truss rod. The truss rod initially engages that one of the seats 18 which imparts the desired tension to the truss rod. The wedge 15 may be inserted with its forward or leading end 24 either at the front or the rear in relation to the step 7.

Because of the wooden structure of a step ladder, looseness in the ladder may develop after a period of use, by reason of shrinkage and the like. The initial rigidity of the ladder may again be imparted by advancing the wedge 15 transversely of the step so as to lodge the trusss rod in successive seats at progressively increased distances from the face 23 of the step upon which the wedge engages.

No anchorage means is required for the device of the present invention, since the relatively sharp edges 22 of the wedge will bite into or grip the material of the step member as the tension of the truss rod is increased. This biting into or gripping the substance of the step also prevents spreading of the wedge arms 25 as the wedge is advanced to tensioning position.

Thus it will be seen that, as adjustments are required, it is no longer necessary to remove a nail or other anchorage means from the wedge before making the adjustments, as was the case with former tensioning devices. The side rails or stiles 5 may at all times be kept in firm contact with the steps of a ladder, thereby preventing wobbling or twisting thereof. The steps are also reinforced against sagging by the use of this device, as is obvious.

The reinforcing wedge arrangement herein disclosed is applicable to used ladders as well as to new ones. Accordingly, it is contemplated that the wedges may be sold as accessories for ladders, particularly because of their low cost and the ease with which they may be nested and packed for economical shipment.

While the V-shape in cross section sheet metal wedge member is preferable, it is to be understood that a wooden block of comparable shape, having spaced seats along its one edge, may be used to approximately the same effect. A wood wedge as well as sheet metal wedges may be of other than V-shape in cross section, in that a wedge of rectangular cross section or variations from rectangular to V-shape cross section, and having a series of truss rod receiving recesses or pockets, may be adjustable laterally of a step of the ladder for augmenting the tension on the truss rod and which tension may have been reduced by shrinkage of the wooden elements of the ladder. While a wooden wedge would not be capable of attaining a bite upon or into the material of the step upon which the wedge bears, yet the larger contact area of such a wooden wedge upon such step would supply a substantial frictional factor which would substantially attain the benefits derived from the sheet metal forms of wedges.

It is to be understood that various structural changes may be made within the scope of the appended claims, without departing from the spirit of the invention.

What is claimed is:

1. As a new article of manufacture, a tensioning device comprising a wedge formed from a flat isosceles trapezoidal blank of medium gage metal provided with a row of apertures upon its median line, said blank being bent upon said median line through the apertures to provide seats upon the apex for engaging a truss rod, said seats being spaced at progressively increased distances from the free edges.

2. As a new article of manufacture, a ladder truss rod tensioner comprising an elongated body of substantially triangular cross section having convergent base edges, there being a plurality of notches located upon the apex of the body at progressively increasing distances from the base edges, said base edges being of sharp-edged relatively thin metal to gouge into the surface of a ladder step reinforced by the truss rod.

3. As a new article of manufacture, a ladder truss rod tensioner comprising a one-piece sheet metal body initially of flat isosceles trapezoidal formation having a row of perforations therein, the perforation being located upon a line of bending bisecting the angle at which the non-parallel side edges converge, the body when bent along said line assuming a wedge shape with the perforations divided along a common diameter, thereby to form open notches along the apex of the wedge-shaped body, each notch being at a different distance from one of the convergent side edges.

4. In a ladder, the combination of a pair of spaced side rails, a flat step supported at its ends by said side rails, a truss rod below said step and having its ends secured to said side rails, and a wedge formed from a flat isosceles trapezoidal blank of sheet metal provided with a row of apertures upon its median line, said blank being bent upon said median line through the apertures to provide seats upon the apex for engaging the truss rod, said seats being disposed at progressively spaced distances from free edges of the wedge, said wedge being disposed between the step and the trusss rod with the truss rod in one of said seats and with the free edges of the wedge bearing on the underside of the step, the wedge being of shsarp edged, relatively thin metal and penetratting the underside of the step.

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