Aug. 25, 1942. J. W. PEASE 2,294,095

WOODEN LADDER CONSTRUCTION

Filed Feb. 7, 1940

Fig. 1

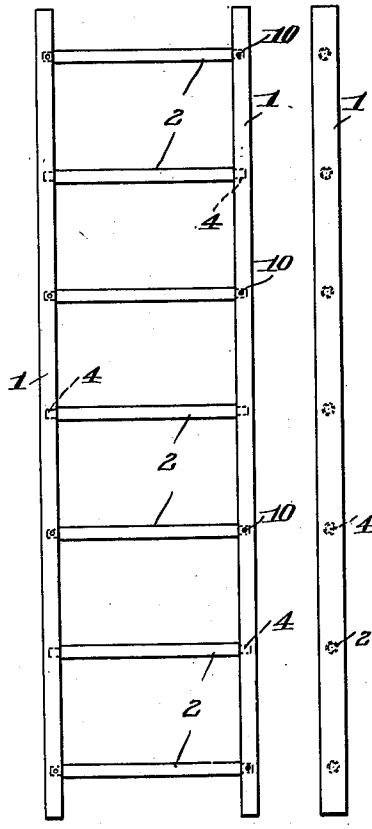


Fig. 2

Fig. 3

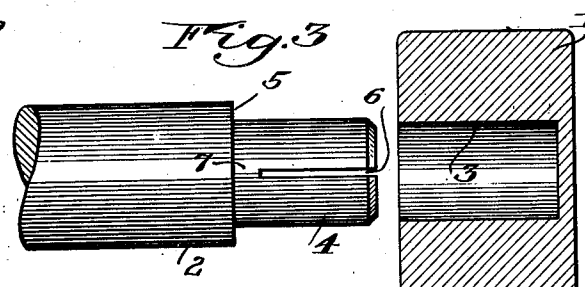


Fig. 4

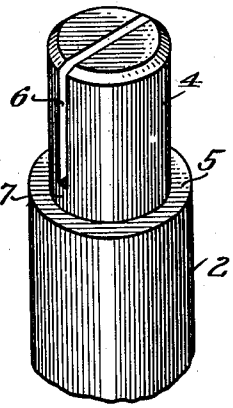


Fig. 5

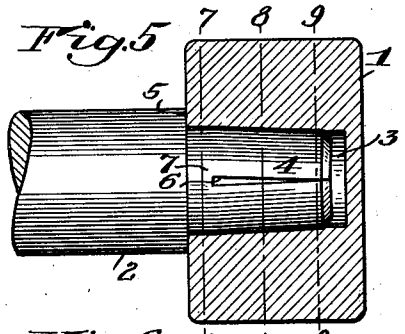


Fig. 6

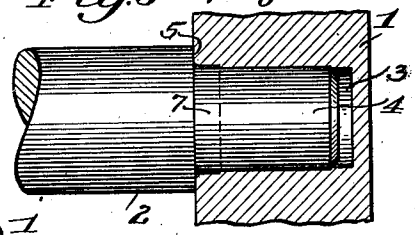


Fig. 8

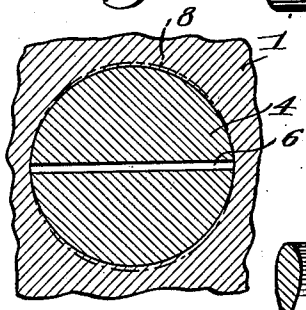


Fig. 7

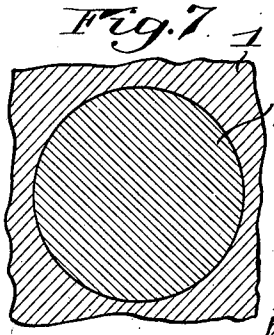


Fig. 10

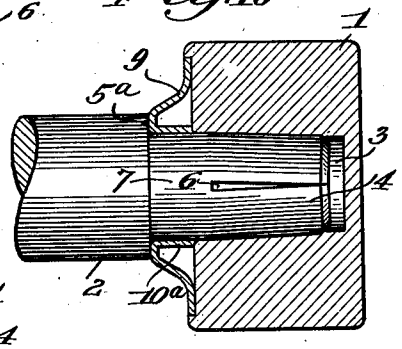
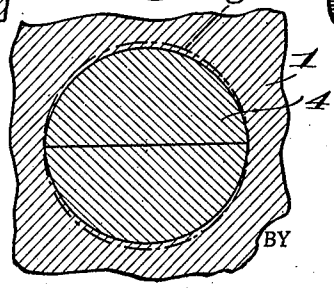


Fig. 9



INVENTOR.
John W. Pease
BY
Russell B. Griffith
his ATTORNEY.

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WOODEN LADDER CONSTRUCTION

John W. Pease, Rochester, N. Y.

Application February 7, 1940, Serial No. 317,734

2 Claims. (Cl. 144—309)

My present invention relates to wooden ladder construction such as the ordinary fruit garden and house ladder, and more particularly to the assembly of the rungs with the side rails and it has for its object to provide a simple and inexpensive method of joining these parts in such manner that they will wear much longer without loosening and produce a permanently rigid ladder that will not weave or spring. The improvements are further directed in part to providing a ladder with either square or round rungs that will not have a tendency to rotate under the feet in use even without the aid of nails thereby promoting the safety of the user and preventing the rungs from twisting into a loose and rickety condition.

To these and other ends, the invention resides in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of this specification.

In the drawing:

Figure 1 is a front view of a ladder constructed in accordance with and illustrating one embodiment of my invention;

Figure 2 is a side view thereof;

Figure 3 is an enlarged view, partly broken away and partly in horizontal section, showing a side rail and a rung in position for assembly;

Figure 4 is a perspective view on the same scale of the tenon end of the rung;

Fgure 5 is a view similar to Figure 3 with the parts completely assembled;

Figure 6 is a section corresponding to Figures 3 and 5, but taken in a vertical plane at right angles thereto;

Figure 7 is a further enlarged section on the line 7—7 of Figure 5;

Figure 8 is a section on the same scale taken on the line 8—8 of Figure 5;

Figure 9 is a section on the scale of Figures 7 and 8 taken on the line 9—9 of Figure 5, and

Figure 10 is a view similar to Figure 5 showing a modification.

Similar reference numerals throughout the several views indicate the same parts.

Referring more particularly to the drawing, my invention is shown embodied in a ladder having side rails 1, rectangular in cross section, and turned rungs 2. The rail in each instance of assembly (which will be described in the singular) is provided with a mortise or socket 3, preferably formed by blind boring it from the inside so that the lateral surfaces of the rail will be continuous and prevent weathering of the joint and of the end grain of the rungs. The rung 2 is first turned down in the usual manner to form a reduced tenon 4, complementary to the bore 3 resulting in an adjacent shoulder 5. I say "complementary" but in fact the diameter of the bore 3 is 1/16 to 1/32 of an inch smaller than the tenon 4 with regard to usual general ladder proportions such as that of Figures 3 to 6 drawn to scale.

I next cut a kerf 6 of substantial with diametrically and endwise of the tenon 4 as clearly shown in Figures 3 and 4. This, however, stops short of the shoulder 5 leaving a normally solid and undisturbed portion of the wood adjacent thereto at 7.

The parts are now prepared for assembly, which latter may be accomplished by driving the rungs into the side rails but which in actual manufacture is effected by placing the elements in a ladder press and pressing the two side rails on to the tenons of the rungs concomitantly. The thing that occurs as a result of the specific structural provisions is this:

As the larger tenon is forced into the smaller bore the bifurcated portions are pressed together, completely or substantially so, at the tip as shown in Figures 5 and 9 and to varying degrees longitudinally thereof down to the depth of the kerf 6, as shown in Figures 5 and 8. In other words, they are pressed into a spring tension, the expanding force of which contributes to the intimacy with which the tenon fits the bore. Not only this, but a comparison of Figures 5 and 6 illustrates that the diameter of such tip of the tenon transversely of the kerf 6 becomes much less than the diameter in the plane of the kerf. In other words, on the first mentioned diameter the tenon becomes slightly tapered or wedge shaped whereas on the other diameter it remains uniform, the opposite sides, though also under compression, being parallel. Therefore, in cross section, the tip becomes noncircular or oval as indicated by the dotted line 8 in Figure 9, which line indicates the normal diameter and the actual diameter beyond the kerf. This will obviously lock the rung against turning in addition to the great internal pressure produced by forcing the larger element into the smaller space.

Not only is this security provided but as the inner surface of the side rail is forced up into tight abutment with the shoulder 5 a greater compression of the rung tenon and/or dilatation of the side rail bore occurs in the region of the solid portion 7 of the tenon. When its

greater and maximum diameter is forced into the smaller bore there is an even greater pressure upon and displacement of the fibers of the wood, but as this comes in a restricted area near the surface of only one side of the side rail (which is of comparatively great thickness) the rail can take it without any tendency to split. There is thus provided the double lock of the non-circular tip at the one end of the tenon and the high compression contact at the other and with the rail carried so tightly against the shoulder 5 not only is the general rigidity of the ladder promoted but the joint is so tight that the weather cannot enter to deteriorate the interior. Preferably the kerfs at the opposite ends of the rungs are in the same plane and when assembled they are disposed vertically as shown in Figures 5 and 6, instead of horizontally so that any tendency of the ladder to weave will be resisted by the substantially normal diameter of Figure 6 rather than the tapered diameter of Figure 5.

In Figure 10 I have illustrated a modification showing the manner in which my present invention may be utilized in connection with the invention of my prior Patent No. 1,729,963, dated October 1, 1929. This has the features and advantages of the simpler construction of Figure 5, but in addition the ferrule 9 that takes the weight on the rung away from the tenon has a central tubular portion 10 that engages the base of the tenon so that the same relationship between the side rail and the shoulder 5*a* is established through the medium of the ferrule which intervenes.

If nails are used to pin the tenons in the side rails with my construction, they need not be used in each instance, as pinning alternate rungs as indicated at 10 in Figure 1 will be found to be sufficient.

I claim as my invention:

1. The method of assembling wooden ladders which embodies boring the side rails to a given diameter, turning down the ends of the rungs to form shoulders and adjacent cylindrical tenon portions of a uniform diameter appreciably greater than that of the bores, cutting diametrical kerfs in the tenons endwise but terminating them short of the shoulders so that a solid portion is left at the base of the tenon, and pressing the side rails onto the tenons and against the shoulders so that the resulting bifurcated tips of the tenons are placed under expanding tension and become substantially non-circular in cross section, and the material on near surface areas only of the bores at the rung sides of the side rails are compacted densely by the oversize and solid tenon portions located between the bottom end of the kerf and the shoulder.

2. In a rung and side rail ladder assembly, the combination with a wooden side rail having a circular bore therein, of a rung reduced at the end to form an oversize tenon of uniform diameter throughout and an adjacent shoulder, the tenon being provided with an endwise diametrical kerf extending near but not to the shoulder and being driven into the bore so that the shoulder abuts the inner surface of the side rail, the bifurcations at the tips of the tenon being closed together within the bore so that they are non-circular in cross section and under expanding tension while the material on the near surface areas only of the bore at the rung side of the side rail is compacted densely adjacent to the oversize and solid tenon portion located between the bottom end of the kerf and the shoulder.

JOHN W. PEASE.