

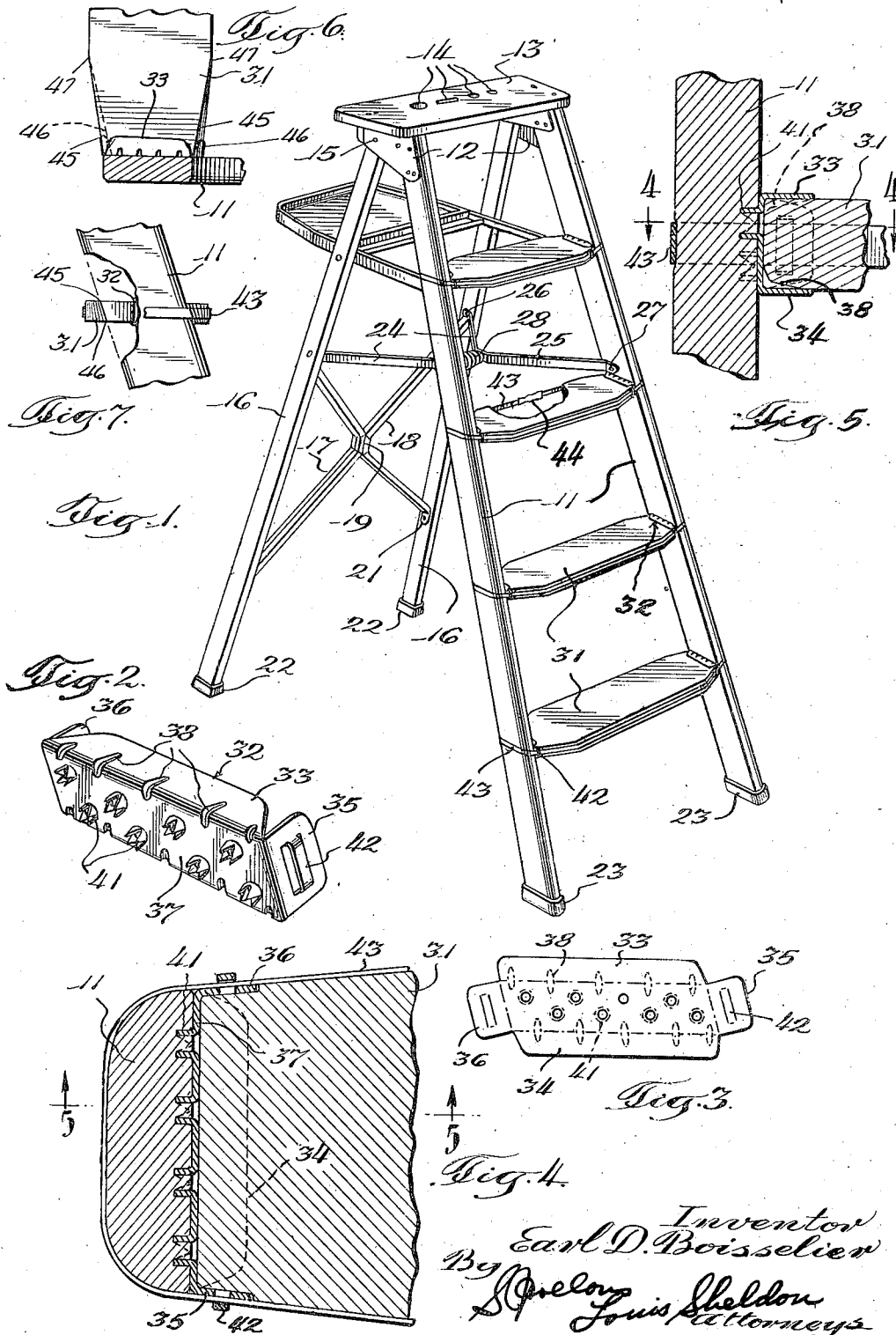
Aug. 5, 1947.

E. D. BOISSELIER

2,425,025

STEP LADDER CONSTRUCTION

Filed Feb. 15, 1945



UNITED STATES PATENT OFFICE

2,425,025

STEPLADDER CONSTRUCTION

Earl D. Boisselier, Glenn Ellyn, Ill., assignor to
Sears, Roebuck and Co., Chicago, Ill., a corpo-
ration of New York

Application February 15, 1945, Serial No. 578,035

2 Claims. (Cl. 228—58)

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The present invention relates to ladder structures and is concerned more particularly with improvements in assembled wooden step ladder construction.

It is a principal object of the present invention to provide a step ladder construction in which the steps or treads are secured to the side bars of a ladder by means of a clamping and strapping apparatus in order to produce a secure, efficient and economical assembly having ample strength and rigidity to withstand the loads and strains incident to the use of such apparatus while yet requiring minimum labor and material to assemble.

A secondary object of the invention is one of attaining the aforementioned achievements without unduly increasing the weight of the ladder construction elements beyond the bare essentials, thereby enhancing practicability and compactness.

Briefly, the present invention consists of a ladder construction in which the ladder steps, rungs or treads are fitted with sheet metal pre-formed assembly brackets provided with extruded punch formations that may imbed themselves into the stiles or ladder bars when during assembly pressure is applied thereto. Steel strapping material surrounding the ladder steps and the ladder bars is applied and drawn into position by means of conventional strapping tools after the manner of box strapping practice, whereupon strapping seal bands are applied and the assembly is completed in accordance with the number of ladder steps or rungs. The over-all weight of ladders assembled in this manner is considerably less than the weight of ladders of corresponding strength when assembled under previously known practices.

For a more comprehensive understanding of the invention, reference will now be had to the accompanying drawing and to the following detailed specification, in which like reference characters designate corresponding parts throughout, and in which:

Fig. 1 is a perspective view of a wooden folding ladder having embodied therein certain principles underlying the present invention;

Fig. 2 is a detail perspective view of a ladder step assembly cap or bracket preformed in accordance with a preferred embodiment practice to the present invention;

Fig. 3 is a detail plan view of the cap element featured in Fig. 2 stamped but unformed;

Fig. 4 is a plan sectional view of a ladder step

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assembly somewhat enlarged and discernible as taken upon the line 4—4 of Fig. 5;

Fig. 5 is a fragmentary detail view of the joint construction featured in Fig. 4 and taken approximately on line 5—5 thereof.

Fig. 6 is a plan sectional detail view taken on a line parallel and just above one of the ladder treads, and

Fig. 7 is a fragmentary side elevational view with a portion broken away to reveal the tread and stile structure at the point of juncture.

Referring now more particularly to the accompanying drawing, attention is directed to Fig. 1, wherein the reference numeral 11 designates the side rails or stiles of a folding step ladder. During the utility position, as featured in this illustration, these rails incline forwardly and are preferably secured as by the means of a pair of angle brackets 12 to a top platform 13 after conventional manner. In order to render the ladder of special utility to certain classes of crafts, the platform 13 is provided with characteristically shaped orifices 14 for receiving tools such as drills, augers, squares, etc., and for holding such instruments in convenient and accessible positions secure against inadvertent dropping or loss.

The brackets 12 provide pivot support as at 15 to a pair of back legs 16 that are tied together by means of the cross bracing channel members 17 and 18. This cross bracing is constructed of a pair of oppositely formed channel V members spot welded or riveted at their point of junction 19 and secured by anchor screws or rivets at their extreme lugs 21 to the leg rails 16.

As a safety precaution, the back legs 16 as well as the ladder stiles 11 are terminated with skid-proof lining shoes 22 and 23 at their extremities. The spread or utility position of the ladder is maintained through the means of a set of pivoted links, rearmost ones of which are designated 24 and foremost ones 25, each pivoted as at 26 and 27 to the rear and fore leg members or stiles, respectively, and all pivoted at a median pivot axis which coincides with a supporting handle 28. The previously described features of construction follow in general conventional ladder apparatus design although specifically enhanced by novel features, more about which will be related hereinafter.

The side rails or stiles 11 are provided at periodic regular spacings with rungs or ladder treads 31 angularly placed with respect to said stiles so that during the spread or utility position of the apparatus their surfaces will be disposed parallel to the supporting floor. Particular attention is

now directed to the manner in which the treads are secured to the stiles and in this connection attention is directed to Figs. 2, 6 and 7.

As best indicated in Figs. 1 and 6, the tread will be observed to be tapered endwise so as to coincide at the extremity with the width of the stiles 11 and the end portions of each tread are preferably encompassed by sheet metal lining caps 32 preformed in accordance with the features best revealed in Fig. 2 which include top and bottom escutcheon plates 33 and 34, see also Fig. 3, side escutcheon plates 35 and 36, as well as the principal sheet metal panel section 37.

The caps 32, when formed, are preferably reinforced by means of depressed angular flute indentations 38 which occur at intervals in the side plate corner bend and which serve not only to strengthen the sheet metal corner formations against inadvertent flexing, but also these indentations bite into the end grain of the treads 31 during assembly pressure, as will later be described, integrating the assembly more soundly and preventing displacement if such movement were otherwise permitted as a result of dimensional discrepancies due to shrinkage or other causes.

The center panel 37 of the cap formations is provided with deformed extrusions 41 at each of a plurality of perforation loci and these formations are irregular and sharp pronged, as result from die piercing operations. The object of so providing the end panel is for obtaining a plurality of rigid wood-entering elements which may imbed themselves into the wood grain of the side rails 11, as best indicated in Fig. 4, and the force for causing this inter-relationship, as well as for maintaining the assembly, is obtained by means of a steel strapping embracement which is threaded through raised guide strips 42 and crosses around the periphery of each tread 31, as well as traversing the proximate area of the upright or stile 11, as best indicated in Fig. 1.

It has been found that by shaping the peripheral surfaces of the tread 31 so that they are perpendicular to the faces thereof, the proper displacement of strapping material surfaces is attained so as not to incur lateral open conditions between the strapping 43 and any of the surfaces adjacent thereto throughout its course of definition. The steel strapping 43 may be applied in accordance with known practices in the box and packaging arts and includes apparatus for drawing the ends of the strap together, followed by the placement of appropriate securing or clamping elements 44, Fig. 1. By means of such an arrangement, the straps 43 are held in their respective overlapped condition under the tension attained during the operation of the applicator tool fully maintained and constantly exerting a holding or assembly force upon the side rails or stiles 11 with respect to the intermediate treads 31.

This construction has been subjected to loads and rigorous tests and has proved not only of lasting and stout service characteristics, but equally significant of economical and facile assembly characteristics. In this way, a ladder structure comprising the side rails or stiles 11 and the steps or treads 31 may be quickly and economically assembled, whereas by previous known methods of assembly these members a considerably greater length of time and more costly labor methods were required for so doing.

The treads 31 are preferably shaped as indicated in Figs. 6 and 7, that is, with the major

front and rear edges perpendicular but at points 47 merging into a trapezoidal taper so that the topmost edges meet the adjacent lines of the stiles above, and the lowermost edges similarly flowing into the lines of the stiles below. This arrangement not only makes for graceful and esthetic features but also it fills out the natural tendencies of bulging in the strapping material so that no cracks or buckling effects are manifest anywhere around the encirclement of the straps.

It is to be observed that ladders constructed in accordance with this method have far surpassed the maximum test requirements of load and stress and that they have also withstood changes in weather, seasoning, etc., more favorably than have conventional methods of construction. The straps 43 have been observed to bite into the longitudinal wood grain of the stiles 11 and while, as a matter of practical effect, no load stresses are to be borne by these members, this phenomenon resulting from the assembling operation serves nevertheless, in some measure at least, to rendering the attachment of the tread 31 to the stile 11 more secure by virtue of the embracing effect of the strap 43 cooperating with the penetration and resulting tie between the caps 32 and the inner surfaces of said rails 11.

While the present invention has been explained and described with reference to a more or less specific contemplation of embodiment, it is to be understood nevertheless that numerous details of construction and practices may be invoked without departing from the essential spirit or scope of the invention. Accordingly, it is not intended to be limited by the specific details of the foregoing description, nor by the particular illustrations in the accompanying drawing, except as indicated in the hereunto appended claims.

The invention claimed is:

1. An article of manufacture comprising an end cap for step ladder treads formed of a single sheet of material affording side and end portions bent over from a main panel portion, corner brace reinforcement flutes integral with said side and main portions and pierced extruding projections extending from said cap panels for entering a step ladder stile during assembly pressure.

2. In combination with a step ladder rung, an end cap for encasing the end grain portion of the rung formed of a sheet of material shaped to afford a principal panel portion corresponding in area with that of the rung end-grain and having bent over portions embracing the side and edge surface of the rung, corner brace reinforcement flutes integral with said side bent over portions and said principal panel, and pierced extruding projections extending outwardly from said main panel for entering a step ladder stile during assembly.

EARL D. BOISSELIER.

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