Aug. 17, 1937. J. KUTSCHEID 2,090,331

LADDER

Filed May 4, 1936

Fig. 1.

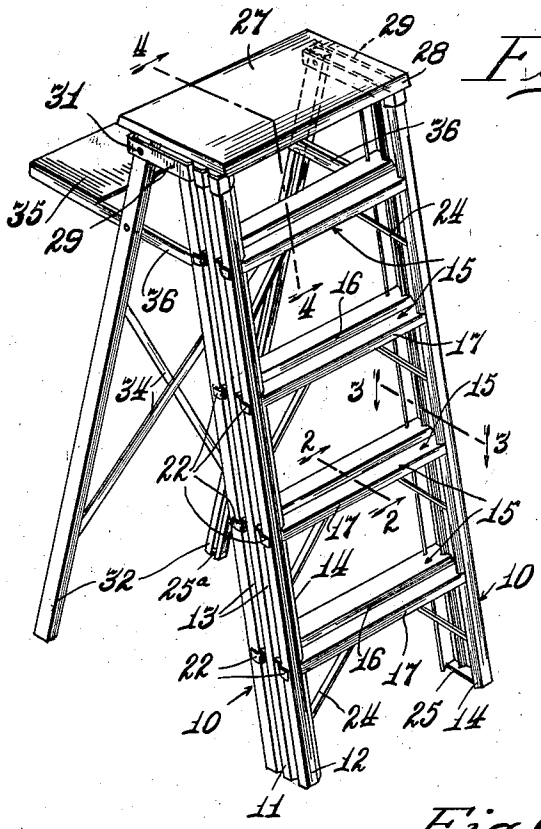


Fig. 5.

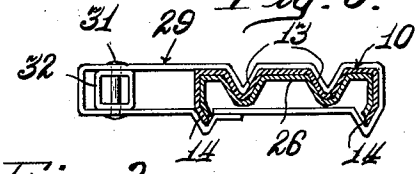


Fig. 2

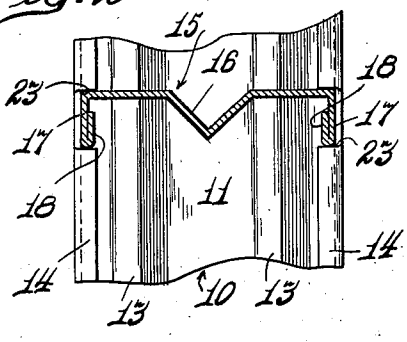


Fig. 3.

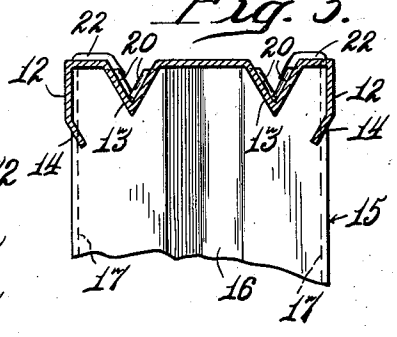


Fig. 6.

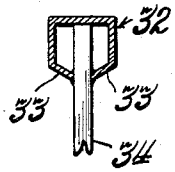
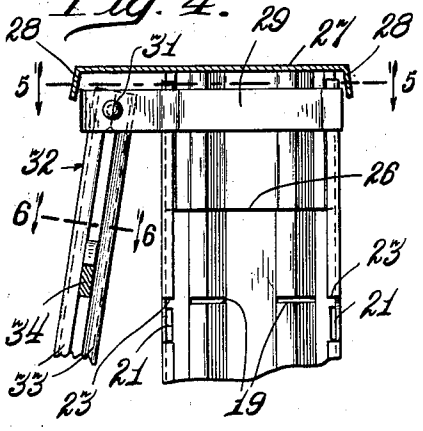


Fig. 4.



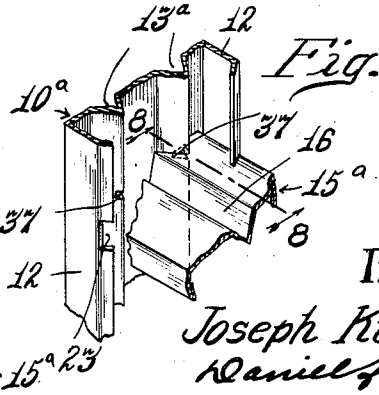
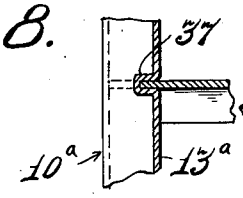


Fig. 7.

Fig. 8.



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LADDER

Joseph Kutscheid, Chicago, Ill.

Application May 4, 1936, Serial No. 77,679

11 Claims. (Cl. 228—29)

The invention relates to improvements in ladders and has particular reference to sheet metal ladders of the type commonly known as step ladders.

An object of the invention is to construct a ladder entirely of stamped sheet metal members embodying novel structural formations and association of parts.

Another object is to provide a ladder of sheet metal construction with strong rigid side rails.

Another object of the invention is to provide a sheet metal ladder with steps rigidly constructed and novelly fitted and secured to the side rails.

Another object is to provide improved hingedly mounted brace legs and novel means for securing said legs to the ladder proper.

Another object is to construct a sheet metal step ladder with a removable top step.

Another object is to construct a ladder entirely of sheet metal thereby making the legs, rails and steps strong and durable, as well as minimizing the cost of manufacture and rendering the same capable of easy handling and folding.

The foregoing and such other objects of the invention as will appear hereinafter as the description proceeds, will be more readily understood from a perusal of the following specification, reference being had to the accompanying drawing in which:

Fig. 1 is a perspective view of the improved ladder.

Fig. 2 is a vertical sectional view through a step, taken on line 2—2 of Fig. 1.

Fig. 3 is a horizontal sectional view through one side rail taken on line 3—3 of Fig. 1.

Fig. 4 is a fragmentary vertical sectional view taken on line 4—4 of Fig. 1 showing one step removed.

Fig. 5 is a horizontal sectional view taken on line 5—5 of Fig. 4.

Fig. 6 is a sectional view taken on line 6—6 of Fig. 4.

Fig. 7 is a fragmentary perspective view showing a modified structure.

Fig. 8 is a fragmentary vertical sectional view taken on line 8—8 of Fig. 7.

As shown in Figs. 1 through 6 of the drawing, the improved ladder embodies two spaced apart side rails 10, formed of sheet metal, having an intermediate portion 11 and longitudinal side flanges 12. Spaced apart longitudinally extending substantially V-shaped re-enforcing ribs 13 are formed in the intermediate portion 11. The ribs 13 extend in the same direction as the flanged sides 12 and said flanges preferably have their marginal edge portions 14 folded inwardly at an angle to further increase the rigidity of said side rails.

A plurality of steps 15 are provided, each of which is formed of sheet metal having a central longitudinal downwardly directed re-enforcing bead 16 and downwardly extending longitudinal side flanges 17. The flanges 17 may be folded over inwardly upon themselves, as at 18, to further increase the rigidity of the steps.

To facilitate rigid and permanent mounting of the steps in the side rails 10, the side rails have a plurality of slots 19 and 21 arranged in pairs, as shown, for receiving portions of the steps 16 in a manner best shown in Fig. 3. Each flange 17 of the steps 15 extends beyond the ends of the step portion forming lips 22 which extend through the respective slots 21 when the steps are in place and are bent over against the outside face of the rail 10 with the free edge of the lips 22 terminating within the V-shaped rib 13 of said side rail.

The marginal edge portions of each step, between the flanges 17 and central rib 16 fit into the respective slots 19 of the side rail and said edges are slit and bent over, as at 20, whereby the steps are rigidly supported by the ribs 13 which abut both the top and bottom faces of the step portions. If desired, the angular flange portions 14, on flanges 12, may be cut away, as at 23, so that said flange portions may extend inwardly to overlie and embrace the marginal flanges 17 of the steps thereby further increasing the rigidity of the steps which may or may not be additionally re-enforced by straps 24 secured therebeneath.

The open bottom end of each side rail 10 preferably is closed by securing therein a substantially U-shaped piece of sheet metal 25 and the upper end of each rail is left open to receive, telescopically, fragmentary rail portions 26 depending from the under side of a top step plate 27. This top step plate 27 preferably has a downwardly extending flange 28 on each edge so that when the top step is in place it adequately protects the user of the ladder from possible injury upon contacting the top edges of a bracket 29 rigidly mounted adjacent the upper end of each side rail 10.

The brackets, 29, best shown in Figs. 4 and 5, each consist of an elongated strip of sheet metal formed to conform substantially to the cross-section of the side rails and extend rearwardly therefrom to provide a channel or bearing bracket adapted to receive therein a pin 31 for securing,

between the two walls of each bracket, the upper end of one leg **32**. Each leg **32** also is substantially U-shaped in cross section and the marginal edge **33** of each of its side flanges is bent inwardly preferably angularly to snugly embrace the ends of suitable cross braces **34** whereby said cross braces **34** may be rigidly secured to the respective legs by welding. A substantially U-shaped plate **25***a* closes the open bottom end of each leg **32**. If desired, a pivotally mounted shelf **35** may be mounted adjacent the upper end of the legs **32**, having forwardly extending rails **36** which, when the shelf is in its horizontal position, engage beneath one of the steps **15** for retaining said shelf horizontal.

It is apparent that by making the top step removable the ladder may, upon removal of said step, conveniently be used as a scaffold support whereby the scaffolding may rest upon the upper step **15** between side rails **10**, thus providing an unobstructed scaffold.

The fragmentary illustration of a side rail **10***a* and step **15***a* shown in Figs. 7 and 8 illustrates a modified form of construction wherein the ribs **13***a* of each side rail are detented at **37** to receive the notched marginal edge of steps **15***a* in the same manner as said edge is received by the slot **19** in the structure previously described. This construction materially increases the rigidity of the side rails inasmuch as the ribs **13** are unbroken.

Although exemplary forms of the invention have been described in detail in the foregoing specification and particularly illustrated in the accompanying drawing, it is to be understood that it is desirous not to limit the invention to the precise structures shown and described, but to embody such variations and modifications in detail as will fall within the spirit of the invention and the scope of the appended claims.

I claim:

1. A ladder constructed of sheet metal comprising in combination, side rails, said side rails being channel shaped in cross-section, spaced apart longitudinal ribs formed in each of said rails, said ribs projecting into the channel and each having a plurality of longitudinal and lateral slots, the slots being arranged in pairs and spaced apart longitudinally in groups, steps each constructed of sheet metal, a central reinforcing rib and side flanges formed on each step, and lips on the ends of said sisde flanges adapted to extend respectively one through each longitudinal slot and be bent over into one of said longitudinal ribs, the marginal end portion of each step fitting into the associated lateral slots in said ribs.

2. A ladder constructed of sheet metal comprising in combination, side rails, said side rails being channel shaped in cross-section, parallel spaced apart longitudinal ribs formed in each of said rails, said ribs projecting into the channel and each having a plurality of longitudinal and lateral slots therein, said slots being spaced apart longitudinally in groups, steps each constructed of sheet metal and provided with a central reinforcing rib and side flanges, and lips on the ends of said side flanges adapted to extend through the respective longitudinal slots in said side rails and be bent over into the longitudinal ribs, the marginal end portion of each step fitting into the respective lateral slots in said ribs.

3. A ladder constructed of sheet metal comprising in combination, a pair of side rails, said side rails being channel-shaped in cross-section, spaced apart longitudinal ribs formed in each of said rails, each rib projecting into the channel and having a plurality of longitudinally spaced apart lateral slots arranged in laterally aligned pairs, steps, each constructed of sheet metal and formed with side flanges, and lips on the ends of said side flanges adapted to extend through longitudinal slots in said side rails outwardly of the longitudinal ribs and be bent over into said ribs, the marginal end portions of each step fitting snugly into the respective aligned slots in said ribs.

4. A ladder constructed of sheet metal comprising, in combination, a pair of side rails, flanges forming the side walls of each side rail, the flanges on the opposed rails being disposed towards each other, at least one longitudinal rib in each side rail projecting therefrom in the same direction as said flanges, steps extending between said side rails, interlocking means on the ends of said steps and in said rails to secure said steps to said rails, said flanges and rib being cut out to receive and support the end portions of said steps.

5. A ladder constructed of sheet metal comprising, in combination, a pair of side rails, said rails being substantially U-shaped in cross-section and having an intermediate portion and side flanges, the flanges on the opposed rails being disposed towards each other, longitudinal ribs in each intermediate portion projecting therefrom in the same direction as said flanges, steps extending between and connected at their ends to said side rails, said ribs being cut out to receive portions of said steps and provide supporting means therefore.

6. A ladder constructed of sheet metal comprising, in combination, a pair of spaced apart side rails, flanges forming the side walls of each side rail, the flanges on the opposed rails being disposed towards each other, longitudinal ribs in each side rail between and projecting in the same direction as said flanges, steps extending between and connected at their ends to said side rails, said flanges and ribs being cut out to receive portions of said steps and provide supporting means therefore.

7. A ladder constructed of sheet metal comprising in combination, side rails, said side rails being channel-shaped in cross-section, spaced apart longitudinal ribs formed in each of said side rails, steps mounted between and rigidly secured at their ends to said side rails, a bracket extending laterally from adjacent the upper end of each rail, each bracket consisting of a strip of sheet metal formed at one end to conform to the cross section of the side rails to which it is secured, the other end of each bracket being formed substantially U-shaped to provide a journal for a pivot pin, legs pivoted at their upper end one in each bracket, and a flanged top step telescopically mounted for ready removal on said side rails adapted to overlie and partially conceal said brackets.

8. A ladder constructed of sheet metal comprising in combination, a pair of side rails, said side rails being channel-shaped in cross-section, spaced apart longitudinal ribs formed in each of said side rails, steps mounted between and rigidly secured at their ends to said side rails, a bracket extending laterally from adjacent the upper end of each rail, each bracket consisting of a strip of sheet metal formed at one end to conform to the cross section of the side rails to which it is secured, the other end of each bracket being folded over upon itself to provide spaced

apart walls adapted to be journalled to receive a pivot pin, legs each adapted to have its upper end extend between the walls of one of said brackets and be pivoted therein, and a flanged top step, including fragmentary rail portions adapted to telescope into the open upper ends of said side rails adapted to overlie and partially conceal said brackets.

9. A ladder constructed of sheet metal comprising, in combination, side rails, a series of steps extending between and joined at their ends to said side rails, means formed in said rails adapted to support said steps, a bracket extending rearwardly from adjacent the upper end of each side rail, legs, substantially U-shaped in cross section, pivoted at their upper end one in each bracket with their open sides disposed towards each other, flanges on the side walls of each leg, said flanges being disposed angularly towards each other and cross braces connecting said legs, said cross braces having their ends fitted snugly between and joined to said angular flanges.

10. A ladder constructed of sheet metal comprising, in combination, spaced apart side rails, a series of steps extending between and interlockingly secured at their ends to said side rails, means formed in said side rails adapted to support said steps, a bracket extending rearwardly from adjacent the upper end of each side rail, legs pivoted at their upper end one in each bracket, said legs being formed of sheet metal, flanges on the side walls of each leg, said flanges being disposed angularly towards each other, and cross-braces connecting said legs, said cross braces having their ends fitted snugly between and secured by welding to said angular flanges.

11. A ladder constructed of sheet metal comprising, in combination, side rails, a series of steps extending between and joined at their ends to said side rails, a bracket extending rearwardly from each side rail adjacent its upper end, legs pivoted at their upper end one in each bracket, said legs being formed of sheet metal and being substantially U-shaped in cross-section, flanges on the side walls of each leg, said flanges being disposed angularly towards each other and cross-braces connecting said legs, said cross-braces having their ends fitted snugly between and secured to said angular flanges.

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