May 16, 1944. H. P. HOPP ET AL 2,348,906

CHAIN LADDER

Filed June 30, 1943 2 Sheets-Sheet 1

FIG. 1.

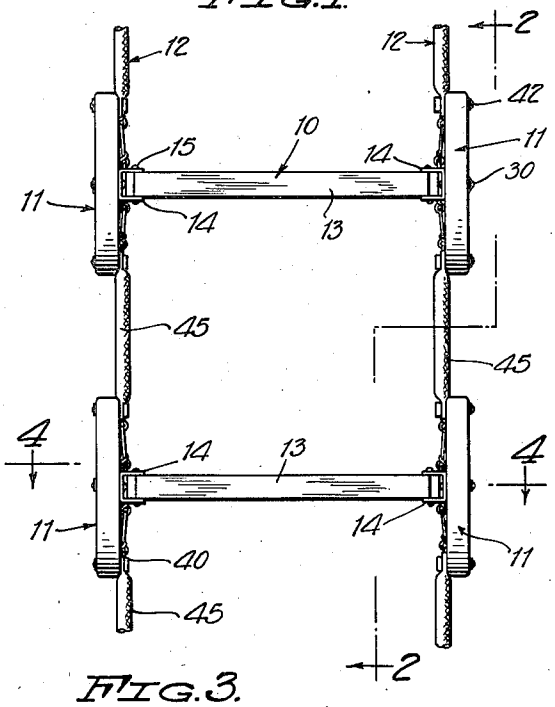


FIG. 2.

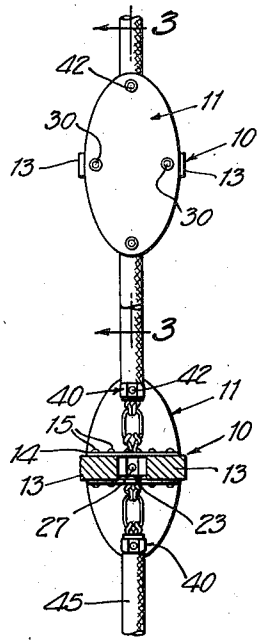


FIG. 3.

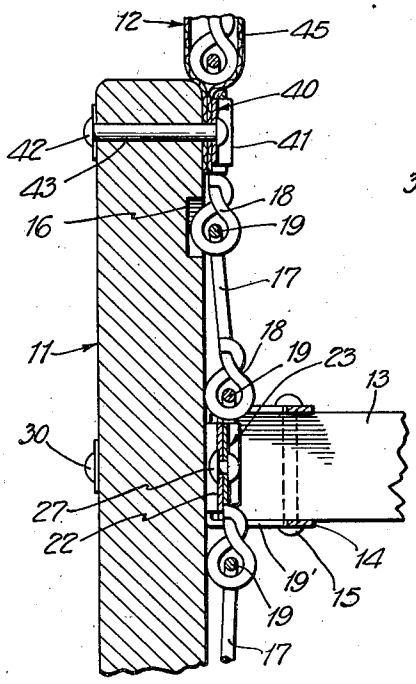
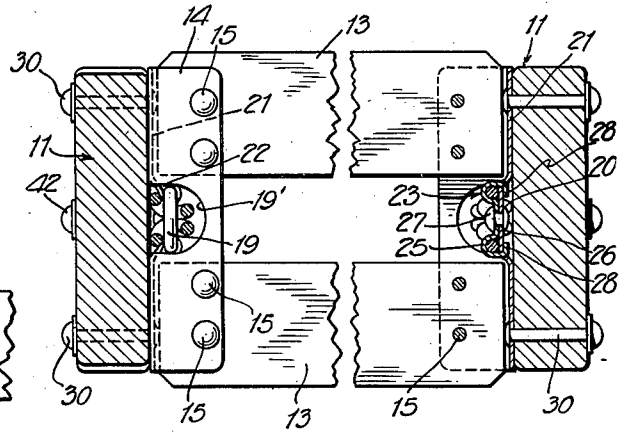


FIG. 4.



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CHAIN LADDER

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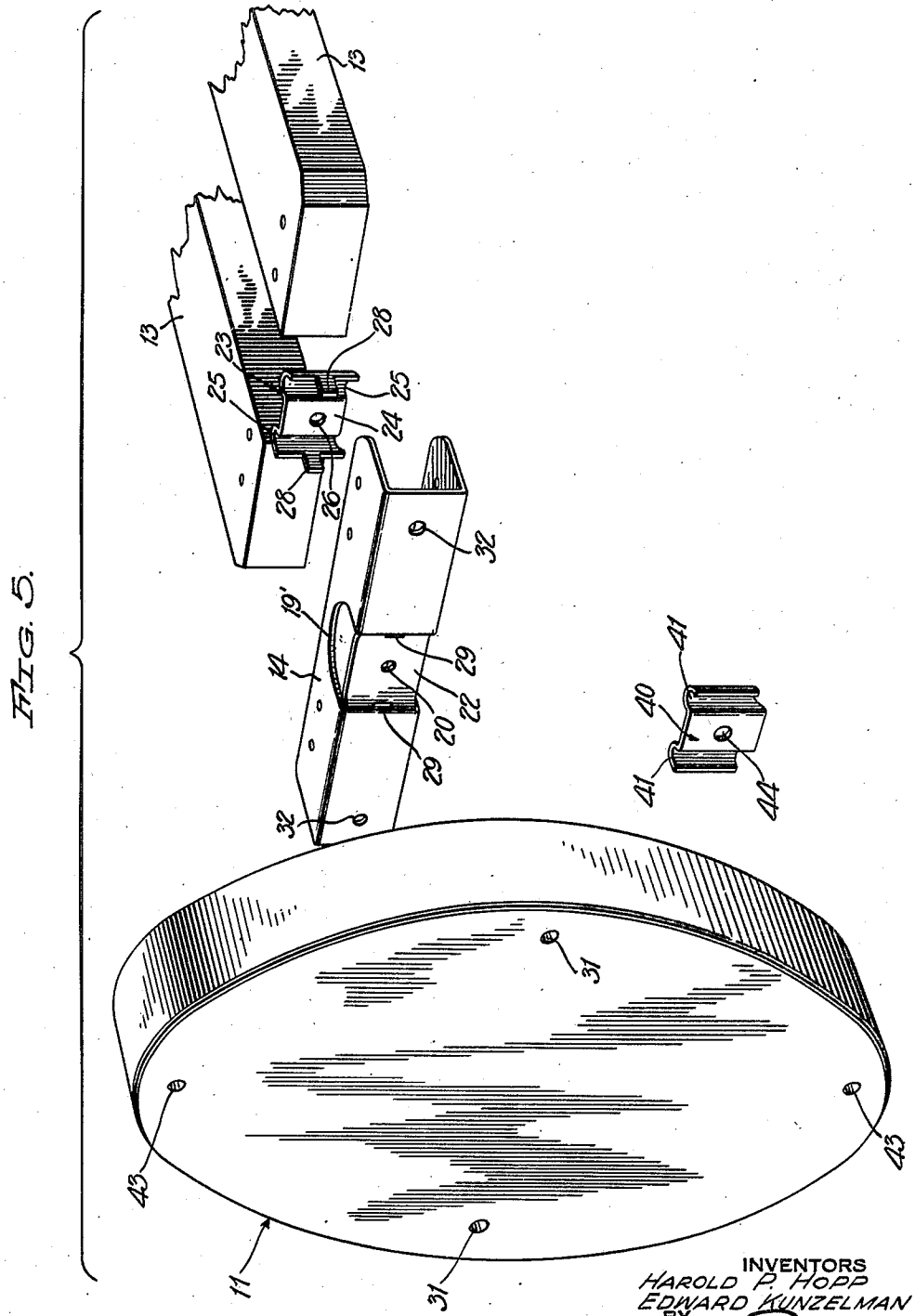


FIG. 5.

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2,348,906

CHAIN LADDER

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Application June 30, 1943, Serial No. 492,790

13 Claims. (Cl. 228—40)

This invention relates to flexible ladders of the type which employ chain side stiles, wooden steps and wooden spacing ears and the subject matter thereof constitutes an improvement over the structure illustrated in our copending application, Serial No. 481,663, filed April 3, 1943.

It is an object of the present invention to provide a novel construction which will permit of the use of wood instead of metal as material for the ladder steps and spacing ears.

It is another object of the invention to provide a novel construction for securing the steps and spacing ears to the side stiles to form the ladder whereby a rigid structure in which rocking movement of the steps and spacing ears relative to the side stiles is reduced to a minimum.

Other objects of the invention will become apparent as the nature thereof is better understood and reference will be had to the drawings, the following specification and the claims wherein the invention is specifically described and claimed.

In the accompanying drawings,

Figure 1 is a fragmentary view in elevation of a section of ladder constructed in accordance with the present invention,

Figure 2 is a detail sectional view taken substantially on the line 2—2 of Figure 1,

Figure 3 is a detail vertical sectional view on an enlarged scale, taken substantially on the line 3—3 of Figure 2,

Figure 4 is a horizontal sectional view on an enlarged scale taken substantially on the line 4—4 of Figure 1, and;

Figure 5 is a distended perspective view illustrating the several elements of the structure, except for the side stiles.

Referring to the drawings by reference character, 10 designates the ladder steps, 11 designates the spacing ears, and 12 designates the side stiles.

As best illustrated in Figure 4, each of the steps 10 consists of two tread members 13 maintained in rigid spaced relation by spacing members 14 which are secured to the ends of the tread members 13 by suitable fastenings 15, herein illustrated as rivets. The tread members 13 are formed from wood, and the spacing members are in the form of channels between the side walls of which the ends of the tread members are secured as above described.

The spacing ears 11 are also formed of wood and are oval in shape. Upon its inner face, each spacing ear is provided with a recess 16 near each end, the purpose of which will hereinafter appear.

The side stiles 12 are of link chain of a conventional type. Each link of the chain has two parallel leg portions 17 which are looped as at 18 to receive the next adjacent link, the opposite ends of the legs 17 being connected by a length 19 which is received in the looped portion 18 of the next adjacent link.

The side walls of the channel members 14 are cut out as at 19' to permit of the channel members being threaded upon the side stiles 12. The cut out portions 19' in the channel members are so positioned as to lie in the space between the two tread members which form the step and are preferably of such dimension as to prevent engagement of the side stiles with the adjacent portions of the tread members of the steps.

As will be noted by reference to Figure 5, the base wall 21 of each of the channel members is provided at a point substantially central of its ends with an opening 20 and the base wall 21 surrounding the opening 20 is countersunk or depressed inwardly of the channel member as at 22 for a purpose to be hereinafter described.

In addition to the channel members forming means for retaining the tread members of the steps in spaced relation, they form means which provide for attachment of the steps to the stiles as will now be described.

For attaching the ends of the steps to the stiles, a clip 23 is employed. This clip has a main body portion 24 in which is formed two spaced channels 25 which latter receive and embrace the leg portions 17 of that link of a side stile to which the end of the step is to be attached with the main body portion of the clip lying between the legs 17 of said clip.

The clip 23 has an opening 26 which registers with the aforementioned opening 20 in the base wall of the channel member. The clip 23 is secured to the base wall of the channel member by means of a rivet 27 which is passed through the alined openings of the channel member and the clip.

Additional means may be employed for securing the clip 23 to the channel member and this means comprises two lugs 28 which pass through openings 29 in the base wall of the channel member and which are turned over as best illustrated in Figure 4 of the drawings.

The spacing ears 11 are secured to the channel members 14 by means of rivets 30 which pass through openings 31 in the spacing ears and

openings 32 in the base walls of the channel members. The side stiles 12 are disposed upon the inner faces of the spacing ears 12 and in such relative position thereto that the looped portions 18 of the links of the stiles will be received in the recesses 16 of the spacing ears thus permitting the side stiles to lie in engagement with the inner faces of the spacing ears at those points between the recesses 16 and their respective ends of the spacing ears.

It will be noted that the inner faces of the spacing ear 11 have a tight contact fit with the outer face of channel members, this being permitted by reason of the fact that the outer heads of the rivets 27 lie in the heretofore mentioned countersunk or depressed portions 22 of the base walls of the channel members.

Means is also provided to secure the side stiles 12 to the spacing ears 11 at points above and below the steps and near the ends of the spacing ears.

This means is herein illustrated as consisting of clips 40, each of which has two spaced channels 41 for receiving the legs of a link of the side stile and the clip is secured to the spacing ear by means of a rivet 42 which passes through an opening 43 in the spacing ear and an opening 44 in the clip.

Between the spacing ears 11, the side stiles are each provided with a protective covering 45.

This protective covering 45 is preferably in the form of a sleeve of canvas or other suitable material threaded upon the side stiles and these sleeves are of sufficient length that they may be secured at their ends to the inner face of the spacing ears by the clips 40 and the rivets 42, heretofore mentioned, as illustrated in Figure 3 of the drawings.

In assembling the several parts to form the ladder, the channel members 14 and the protective coverings 45 are alternately threaded upon suitable lengths of chain which are to form the side stiles of the ladder.

The channel members 14 are next secured to the side stiles by the clips 23, the rivets 27 and the lugs 28. The next step in the assembly is the attachment of the side stiles 12 to the channel members 14 by means of the rivets 30 after which the side stiles are attached to the spacing ears 11 by the clips 40 and the rivets 42.

These operations complete the assembly of the side stiles, after which the step forming tread members are secured between the side walls of the channel members by the rivets 15.

From the foregoing it will be apparent that the present invention provides a flexible ladder which is of simple construction, readily assembled and highly efficient for the purposes intended.

Furthermore, by attachment of the side stiles to the spacing ears at the ends thereof and to the ends of the steps at points intermediate of the ends of the ears, any rocking movement of the steps relative to the side stiles is reduced to a minimum.

The invention has been herein illustrated in its preferred form, but it is to be understood that it is not to be limited to the specific constructions shown and that it may be carried out in such other forms as rigthly fall within the scope of the appended claims.

Having thus described the invention, what is claimed as new is:

1. A ladder of the type described comprising in combination, steps, spacing ears and flexible side stiles, channel members carried by the ends of the steps, the side walls of said channel members having cut out portions to receive the side stiles therein, means for securing each of the channel members to its respective side stiles, and means for securing each of the side stiles to its respective spacing ear.

2. A ladder of the type described comprising in combination, steps, spacing ears and side stiles in the form of link chains, channel members carried by the ends of the steps, the side walls of said channel member having cut out portions to receive the side stiles therein, means for securing each of the channel members to its respective side stile, and separate means for securing each of the side stiles to its respective spacing ear upon opposite sides of the step.

3. A ladder of the type described comprising in combination, wooden steps, wooden spacing ears, and side stiles in the form of link chains, channel members embracing the ends of the steps with their base walls disposed outwardly of the ends of the steps, said channel members having their side walls cut out to permit of passing the side stiles therethrough, means for securing each of the side stiles to the inner face of the base wall of its respective channel member, means for securing the spacing ears to their respective channel members, and means for securing the stiles to their respective spacing ears upon opposite sides of the step.

4. A ladder of the type described comprising in combination, wooden steps, spacing ears and side stiles in the form of link chains, channel members carried by the ends of the steps, the side walls of the channel members being cut out to permit of the passage of the side stiles therethrough, a stile link embracing clip for securing each of the side stiles to the base wall of its respective channel member, means for securing said clip to the channel member, means for securing each of the channel members to its respective spacing ear, and separate means for attaching each of the spacing ears to its respective side stile upon opposite sides of the step.

5. A ladder of the type described comprising in combination, wooden steps, spacing ears and side stiles in the form of link chains, channel members carried by the ends of the steps, the side walls of the channel members being cut out to permit of the passage of the side stiles therethrough, a stile link embracing clip for securing each of the side stiles to the base wall of its respective channel member, means for securing said clip to the channel member, means for securing each of the channel members to its respective spacing ear, and separate means for attaching each of the spacing ears to its respective side stile upon opposite sides of the step, said last mentioned means comprising stile link embracing clips and means for securing said clips to the spacing ears.

6. A ladder of the type described comprising in combination, steps, spacing ears and flexible side stiles, channel members carried by the ends of the steps, the side walls of the channel members being cut out to permit of the passage of the side stiles therethrough, a stile embracing clip for securing each of the side stiles to the inner face of the base wall of its respective channel member, means including a rivet for securing each of said stile embracing clips to its respective channel member, means for attaching each of the channel members to its respective spacing ear, and means for attaching each of the spacing

ears to its respective side stile at points upon opposite sides of the step.

7. A ladder of the type described comprising in combination, steps, spacing ears and side stiles in the form of link chains, channel members carried by the ends of the steps, the side walls of the channel members having cut out portions to receive the side stiles therein, a stile link embracing clip for securing each of the side stiles to the inner face of the base wall of its respective channel member, means comprising a rivet passing through a side stile link and the base wall of the channel member, and lugs integral with the clip and passing through openings in the base wall of the channel member for securing each of said stile link embracing clips to its respective channel member, means for securing each of the channel members to its respective spacing ear, and means for attaching each of the spacing ears to its respective side stile at points upon opposite sides of the step.

8. A ladder of the type described comprising in combination, steps, spacing ears and side stiles in the form of link chains, channel members carried by the ends of the steps, the side walls of the channel member having cut out portions to receive the side stiles therein, a stile link embracing clip for securing each of the side stiles to the inner face of the base wall of its respective channel member, means comprising a rivet passing through a side stile link and the base wall of the channel member, and lugs integral with the clip and passing through openings in the base wall of the channel member for securing each of said stile link embracing clips to its respective channel member, means for securing each of the channel members to its respective spacing ear, means for attaching each of the spacing ears to its respective side stile at points upon opposite sides of the step, and means for securing each of said spacing ears to its respective channel member.

9. In a chain ladder, side stiles, steps and spacing ears carried by the steps at the ends thereof, means for securing the steps to the side stiles and the spacing ears, protective coverings for the side stiles, said protective coverings comprising flexible sleeves enclosing the side stiles and extending from each spacing ear to the next adjacent spacing ear, and means for securing the ends of the protective coverings to their respective spacing ears, and a single means for securing the ends of the protective coverings to their respective spacing ears and the spacing ears to the side stiles.

10. In a chain ladder, side stiles, steps and spacing ears carried by the steps at the ends thereof, means for securing the steps to the side stiles and the spacing ears, protective coverings for the side stiles, said protective coverings comprising flexible sleeves enclosing the side stiles and extending from each spacing ear to the next adjacent spacing ear, and means for securing the ends of the protective coverings to their respective spacing ears, and a single means for securing the ends of the protective coverings to their respective spacing ears and the spacing ears to the side stiles, said means including a side stile embracing and protective cover clamping clip, and means for securing the clip to the spacing ear.

11. A ladder of the type described comprising in combination, wooden steps, spacing ears, and side stiles in the form of link chains, channel members carried by the ends of the steps, the side walls of the channel members being cut out to permit of the passage of the side stiles therethrough, a side stile embracing clip for securing each of the side stiles to the base wall of its respective channel member, means including a rivet passing through the chain embracing clip and the base wall of the channel member and lugs carried by the chain embracing clip and passing through openings in the base wall of the channel member for attaching each of the channel members to its respective side stile, and means for attaching each of the spacing ears to its respective side stile at points upon opposite sides of the step.

12. In a chain ladder having side stiles in the form of link chains, spacing ears, protective sleeve coverings for the side stiles, and a single means for securing the ends of the protective coverings to said ears and to the links of said side stiles.

13. A ladder having flexible suspensory members, rungs composed of a plurality of sections, the sections of each rung spaced from one another in a transverse direction, spacing disks for spacing the ladder from the structure with which it is being used, said rungs being connected to said spacing disks, clips for connecting said disks to said suspensory members, said flexible suspenory members composed of chain links, and flexible non-metallic boots enclosing said chains, said clips engaging the ends of said boots to secure them in place.

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