May 23, 1933. H. HOCH 1,910,546

ROPE LADDER

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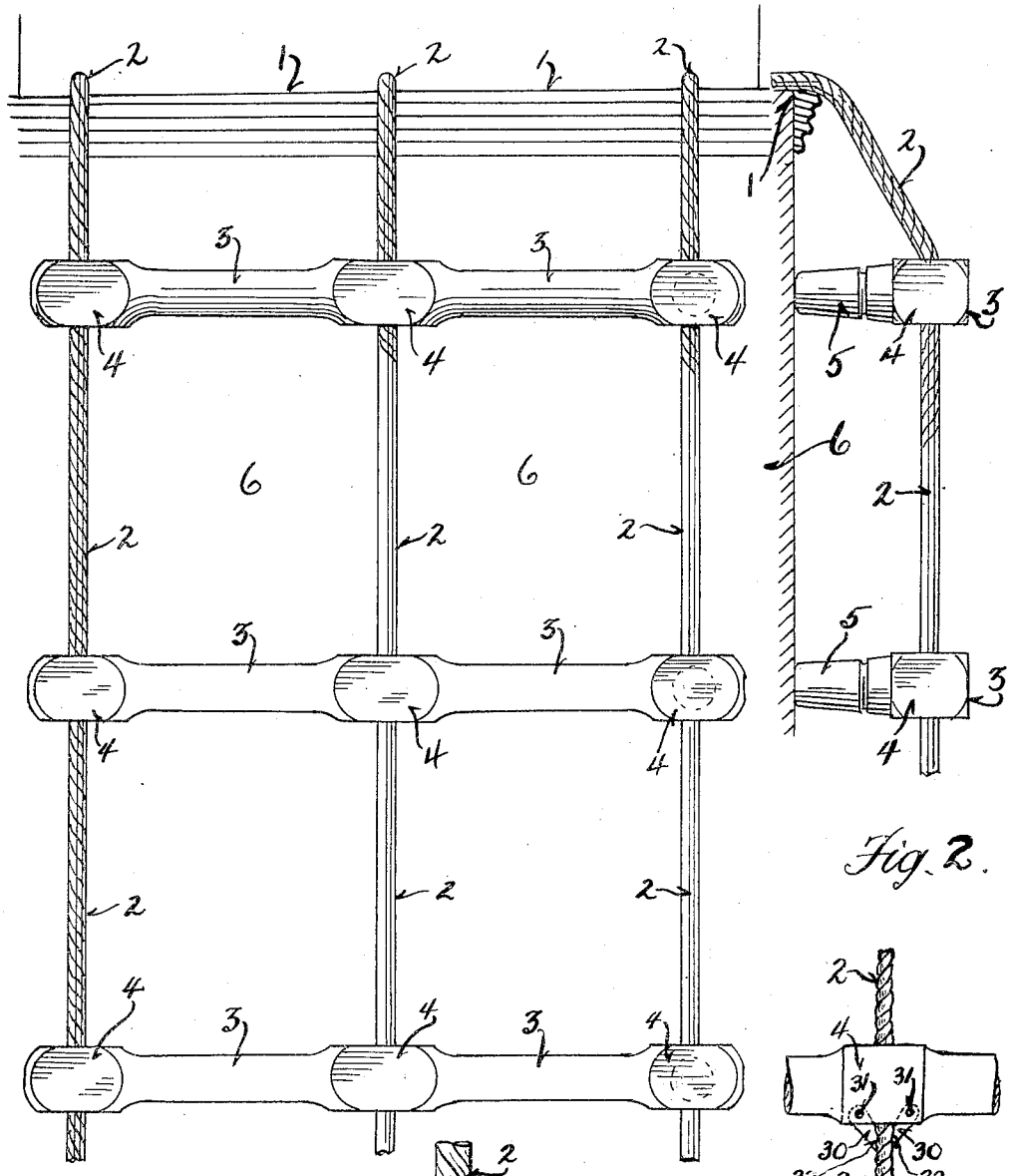


Fig. 1.

Fig. 2a.

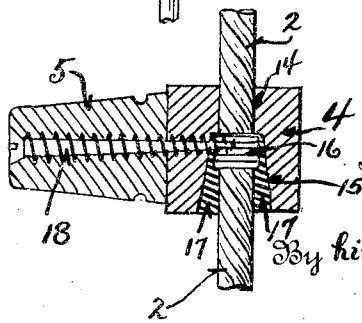


Fig. 4.

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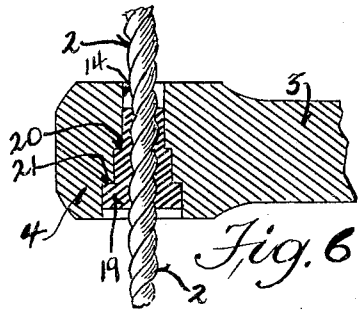


Fig. 6

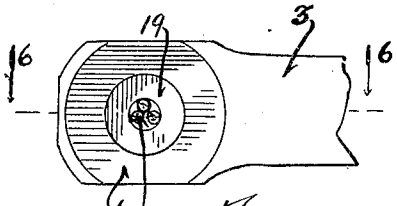


Fig. 5.

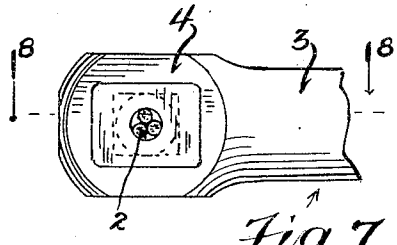


Fig. 7.

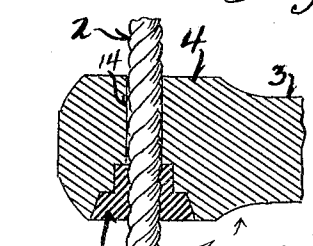


Fig. 8.

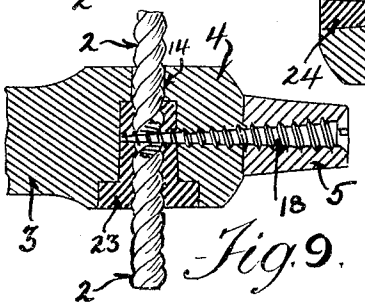


Fig. 9.

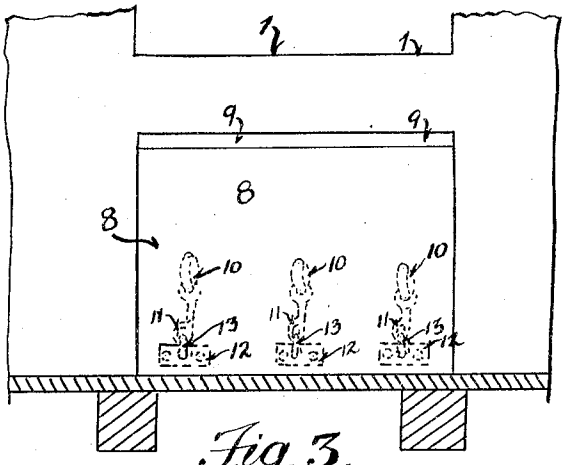


Fig. 3.

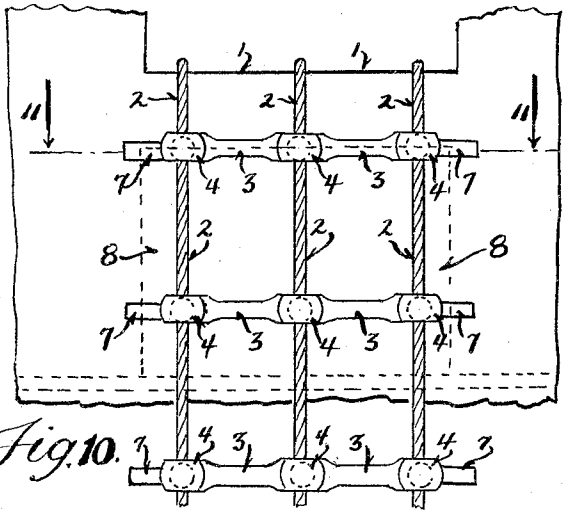


Fig. 10.

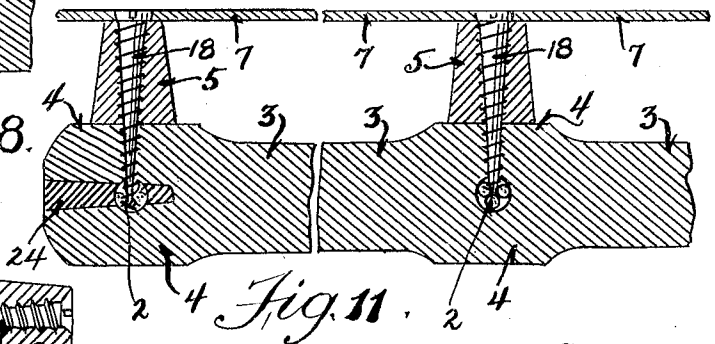


Fig. 11.

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Fig. 12.

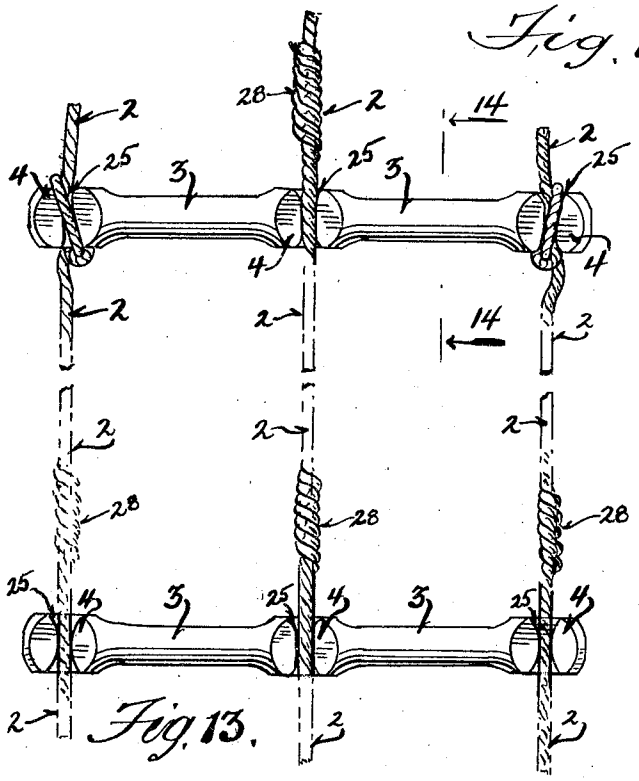


Fig. 13.

Fig. 14.

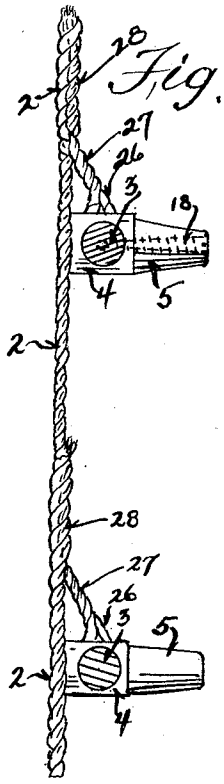


Fig. 15.

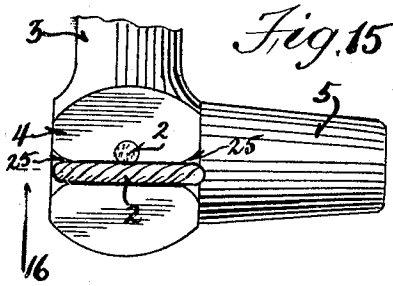


Fig. 16.

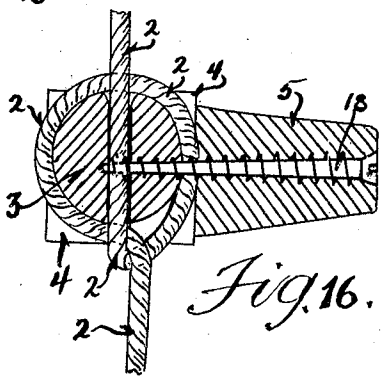


Fig. 17.

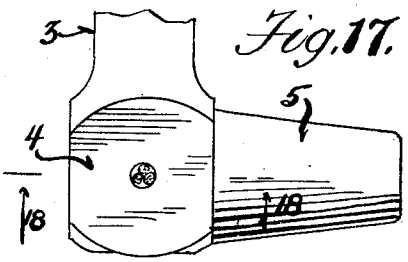


Fig. 18.

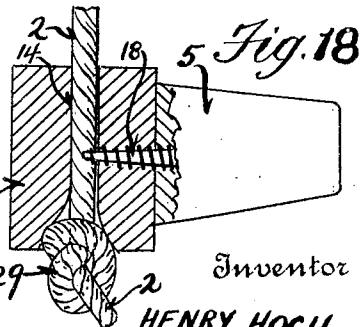
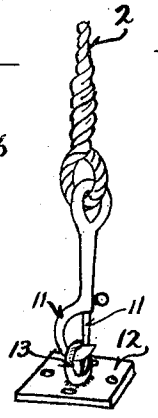


Fig. 19.



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UNITED STATES PATENT OFFICE

HENRY HOCH, OF MORRISTOWN, NEW JERSEY

ROPE LADDER

Application filed April 4, 1930. Serial No. 441,443.

This invention relates to the creation of a novel rope ladder structure.

One of the objects of this invention is the creation of a rope ladder provided with means for securing the rungs thereof against slippage along the ropes thereof, employing for this purpose a plurality of securing means adapted to secure the rungs against any such undesirable displacement.

A further object of this invention is the provision of a neat, compact and flexible rope ladder comprising a plurality of rungs united by a number of ropes passing through enlargements on said rungs, which rungs are prevented from displacement along the ropes by the disposition thereon of novel means for securing said rungs to said ropes at predetermined positions therealong.

Various other objects and advantages of the invention than those hereinabove mentioned will appear more fully hereinafter. It is to be understood, that the specific forms shown are merely illustrative and hence the detailed description thereof is not to be taken as limiting the invention itself.

The invention consists substantially in the combination, construction, location and relative arrangement of parts, all as will be more fully pointed out hereinafter.

Referring to the drawings, it will be seen that

Figure 1 is a front view of my novel rope ladder in suspended position, passing over a window sill at its upper end;

Fig. 2 is a side elevational view thereof;

Fig. 3 is a view inside the window casing showing the box for holding my rope ladder when gathered in and means whereby the ladder, upon passing through the box, may be secured to the inside of the wall;

Fig. 4 is a sectional view through a rung enlargement showing the means whereby the rung is secured against longitudinal displacement along a supporting rope;

Fig. 5 is a plan view of one end of a supporting rung showing rung enlargement and a variant embodiment of securing means;

Fig. 6 is a sectional view taken along the line 6—6 of Fig. 5;

Fig. 7 is a second possible variant embodiment in plan view;

Fig 8 is a sectional view taken along the line 8—8 of Fig. 7;

Fig. 9 is another possible variant embodiment in section;

Fig. 10 is a view similar to Fig. 1, showing cross-braces carried by the rungs;

Fig. 11 is a sectional view along the lines 11—11 of Fig. 10 showing still another possible variant embodiment of securing means;

Fig. 12 is a front view of a variant embodiment wherein the additional securing means is dispensed with and slippage is eliminated by securing the rungs to the supporting ropes proper;

Fig. 13 is a variation of the structure shown in Fig 12;

Fig. 14 is a sectional view taken along the line 14—14 of Fig. 12;

Fig. 15 is a partially broken plan view of one of the end enlargements on the rung shown in Fig 12;

Fig. 16 is a sectional view taken along the line 16—16 of Fig. 15;

Fig. 17 is a partially broken plan view of one of the end enlargements on the rung, similar to Fig. 15, showing a still further possible variant embodiment of securing means;

Fig. 18 is a sectional view taken along the lines 18—18 of Fig. 17;

Fig. 19 is a detail view showing the structure whereby the end of the rope projecting through the box may be secured to a wall bracket; and

Fig. 20 is another possible variant embodiment of securing means.

Like reference characters refer to like parts throughout the several views of the drawings.

Heretofore in the manufacture of rope ladders difficulty has been encountered in the creation of a rope ladder having rungs fixedly spaced with respect to each other along the supporting ropes thereof and permanently secured against slippage therealong. It is the purpose of this invention to provide a compact, flexible and easily adaptable rope ladder employing the usual plurality of supporting ropes and spaced rungs permanently secured against slippage along the ropes by various novel securing means. It is the further purpose of this invention to provide means whereby the various rungs of the said ladder may be supported away from the wall of the house, thus preventing any possible breakage of window panes in the casements in the wall along which the ladder extends.

The desirable purposes set forth are attained as will be disclosed more fully hereinafter by the use of a plurality of novel retaining devices adapted to retain the rungs against slippage along the supporting ropes and, further, by the affixing to predeterminately spaced enlargements along each rung a plurality of spacer spools adapted to hold the ladder rungs away from the wall and which carry at their outer ends a cross brace to prevent the spools on the rungs lying opposite a window casement from contacting with a window pane and injuring the same.

Referring specifically to the figures, it will be seen that in Fig. 1, I have shown a window ledge 1 over which passes a plurality of supporting ropes 2, 2, 2 (shown as three in number). Predeterminedly spaced along each of the ropes 2 are a number of rigid supporting rungs 3, 3, 3 of wood or the like. Each of said rungs is shown as having a plurality of enlargements thereon 4, 4, 4 (also shown as three in number) through which the supporting ropes 2, 2, 2 pass. As will be noted from an observation of Fig. 2 each of the rung enlargements 4 has attached to its inner face a spacer spool 5 adapted to hold the rung away from the wall 6 along which the composite ladder extends.

Referring to Fig. 10 it will be noted that it is possible to support at the end of the spools affixed to the rungs a series of cross braces 7 which prevent the spools from projecting into window casements in the wall along which the ladder extends and eliminnates all possible injury to window panes.

In Fig. 3 it will be observed that I have shown a box 8 having a cover 9. This box is to be placed under the window sill against the inner wall of the room from the window of which the ladder is to stretch. Near the lower end of the back face of such box may be drilled a plurality of holes 10, through which passes the free ends of the supporting ropes. The free ends are then spliced and secured to a plurality of metal spring actuated snap-catches 11, (see Fig. 19). Affixed to the wall of the room underlying the window ledge by bolts or wood screws are permanently affixed a number of securing plates 12, each of which carries a bolt loop 13 adapted to receive a snap-catch 11. The plates 12, having loops 13, may of course be disposed and secured to the wall of the room underlying each and every window casing which it is desired be rendered adaptable for use with my rope ladder. When there has been secured to any given wall the requisite loops and plates all that is necessary to mount a given ladder-containing box and ladder, for use in connection with such window, is to bring the box containing the gathered-in rope ladder into proximity with the wall and to affix the snap-catches 11 which are secured to the plurality of supporting ropes to the corresponding respective bolt loops 13. The cover 9 of the box may be of an ornamental nature and be utilized as a seat or as a supporting table for flower pots and the like, just within the window ledge.

It will be seen that in Figs. 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18 and 20, I have shown a number of different embodiments whereby the rungs may be secured against slippage along the respective supporting ropes. In Fig. 4, it will be observed that the enlarged portion 4 has bored completely therethrough a rope hole 14 which permits of the passage therethrough of the supporting rope 2. The enlargement is counterbored at the bottom flat face to provide a conically shaped hole 15. The rope on being passed through the respective rungs is wound with string or the like 16 over a portion of its length as shown. Thereafter the conically shaped hole is filled with molten solder, Babbitt metal or the like to form a conical plug 17 which prevents slippage.

Secured to the enlargements 4 are the spools 5 held thereto by wood screws 18 which pass completely through the spool and about halfway through the enlargement 4 into the plug 17 and into the body of the rope 2. Thus it may be seen that aside from the holding effect of the plug member 17 there is created and utilized the additional holding effect of a plurality of wood screws 18.

In the embodiment shown in Figs. 5 and 6, instead of using a conically shaped counterbored hole for forming the securing plug member I have provided a series of stepped counterbores in the enlargement 4. When the hole 14 in such an embodiment is closed at the upper end by caulking or the like and heated metal is poured in, a plug member of the type 19 is created which has a plurality of operative retaining surface 20 and 21. In this embodiment too, the spool 5 is held mounted by a wood screw 18 so that again

the additional holding effect of the wood screw is availed of to not only hold the spool to the enlargement 4 but to also aid in holding the rope against slippage.

Now turning to Figs. 7, 8 and 9, it will be observed that I have provided, by the choice of proper combinations of counterboring, two other types of plugs such as the cylindrical and conical member 22 and the double cylindrical member 23.

In Fig. 11 the retaining plug shown, 24, is of a type which lies in the plane of the axis of the screw 18 and does not lie in line with the axis of the rope, but is approximately perpendicular thereto. To make this form the enlargement 4 is bored at one end thereof along the axis of the rung and the heated metal is poured into the bored hole to form the retaining plug 24 having a holding effect with respect to the strands of the rope 2 analogous to the holding effect of the screw 18. Of course, when the metal is poured to form the plug member 24, both ends of the hole through which the rope passes from one face of the rung enlargement to the other must be sealed up by caulking so that the metal does not run out.

In Figs. 12, 13, 14, 15, 16, 17 and 18, a still further variant possible embodiment of another general type is illustrated. In this type no molded metal plug member is used. Thus in Fig. 12 peripheral grooves 25 are cut in each of the rung enlargements. In these grooves there is wound and hitch-knotted the sustaining ropes 2 after the fashion shown at either enlarged end of the rung 3. A hitch-knot of the type shown at the ends of the rung may also be used at the center enlargement of the rung, or, should it be deemed more expeditious to do so the center enlargement 4 with its circular cut groove may have secured thereto a rope loop 26 which is connected to a suspensory connecting portion 27 which is spliced to the rope 2 at 28 (see Fig. 13). This method of securing the center enlargement to the center supporting rope 2 might also be adopted to support each of the end enlargements as shown in Fig. 13 thereby dispensing with the need of winding the end ropes 2 about the enlargements and preserving the up or down continuity of each main supporting rope 2. As shown in Fig. 15, when the rope is looped about any one of the enlargements and the spool is attached by a wood screw 18, the wood screw passes twice through the rope and acts as additional securing means therefor.

Now referring specifically to Fig. 18, it will be observed that by forming a knot 29 in the supporting rope 2 just below each enlargement it is possible to support the plurality of rungs on a series of knots in the supporting rope 2. Of course, there is added to the supporting effect of such knots the effect of the wood screws 18 passing into supporting rope 2 as disclosed.

Finally referring to Fig. 20, which discloses a still further variant embodiment for securing the rope 2 to the rung enlargements, it is noted that in the enlargement there is secured a plurality of pivoted arms 30 rotatably mounted on pivots 31 secured in the enlargements. These pivoted arms having jaws 32 which act to permit the passage of the rope 2 through the enlargements in one direction and prevent its withdrawal in the opposite direction by a ratchet like effect.

It will be seen from the foregoing that I have provided a complete rope ladder structure wherein a plurality of rungs may be supported in predetermined spaced-apart relation along a plurality of supporting ropes in a secure, flexible and rugged fashion.

Inasmuch as many changes may be made in the above construction and many apparently widely and different embodiments of the invention may be made without departing from the spirit and scope thereof, it is intended that all matter hereinabove contained or shown in the accompanying drawings shall be interpreted as illustrative and not in any way limiting. The following claims are intended to cover all generic and specific features of the invention described.

What I claim for United States Letters Patent is:

1. As a new article of manufacture, a rope ladder comprising a plurality of supporting ropes, a plurality of rungs having a plurality of enlargements thereon through which said ropes pass, a spacer-spool mounted on each of said enlargements, and a cross-brace member for each of the rungs secured across said spools at their outer free ends.

2. As a new article of manufacture, a rope ladder comprising a plurality of supporting ropes, a plurality of rungs having bored enlargements therein, and a turret shaped securing plug member formed on each supporting rope by the pouring and cooling of heated metal into said enlargements.

3. As a new article of manufacture, a rope ladder comprising a plurality of supporting ropes, a plurality of rungs having bored enlargements therein, and a cylindrical and pyramidal shaped securing plug member formed on each supporting rope by the pouring and cooling of heated metal into said enlargements.

4. As a new article of manufacture, a rope ladder comprising a plurality of supporting ropes, a plurality of rungs having bored enlargements therein, and a double cylindrical plug member formed on each supporting rope by the pouring and cooling of heated metal into said enlargements.

5. As a new article of manufacture, a rope ladder comprising a plurality of supporting ropes, a plurality of rungs having bored en-

largements therein, and a conically shaped plug member formed on each supporting rope by the pouring and cooling of heated metal into said enlargements.

6. As a new article of manufacture, a flexible rope ladder comprising a plurality of supporting members, a plurality of rungs having enlargements thereon, said enlargements having orifices therethrough through which the supporting members pass, and means disposed in said orifices in the rung enlargements adjacent the under-surface thereof for holding each rung in fixed relation with respect to the supporting members and the other rungs.

7. As a new article of manufacture, a flexible rope ladder comprising a plurality of flexible supporting members, a plurality of rungs having enlargements thereon and recesses formed therein at the under-surface thereof, and means including a plurality of predeterminedly shaped plug elements secured on said flexible supporting members and disposed in said recesses for securing said rungs to said members.

8. As a new article of manufacture, a rope ladder comprising a plurality of flexible supporting members, a plurality of rungs having predeterminedly shaped recesses formed therein adjacent the under-surface thereof, and means including a plurality of predeterminedly shaped plug elements formed on said members and disposed in said recesses for cooperating therewith to secure said rungs to said members.

9. As a new article of manufacture, a rope ladder comprising a plurality of flexible supporting members, a plurality of rungs having recesses formed therein adjacent the bottom of the respective rungs, means secured to said members for disposition in and cooperation with said recesses for securing the rungs to said members, and means including a snap-catch and ring plate for securing said members to the wall of a room underlying a window ledge.

10. As a new article of manufacture, a flexible rope ladder comprising a plurality of flexible supporting members, a plurality of rungs having enlargements thereon, and conically shaped recesses formed in the under-surface of said enlargements, and means including a plurality of conically shaped plug elements secured on said flexible supporting members and disposed in said recesses for effecting a wedging action and securing said rungs to said members.

11. As a new article of manufacture, a rope ladder comprising a plurality of flexible supporting members, a plurality of rungs having a plurality of conically shaped recesses formed in the under-surfaces thereof, and means including a plurality of cooperating conically shaped plug elements secured on said supporting members and disposed in the said recesses in said rungs for predeterminedly, permanently and securely fixing said rungs in spaced-apart relation along the said members.

12. As a new article of manufacture, a rope ladder comprising a plurality of flexible supporting members, a plurality of rungs having enlargements thereon and orifices formed through said enlargements from the under-surface of said rungs to the upper surfaces thereof, said orifices being, adjacent the under-surface of the rungs, enlarged and predeterminedly shaped, and a plurality of securing elements secured to said supporting members and adapted to seat within the enlarged portion of said orifices for securing the flexible supporting members which pass through said orifices to the rungs.

13. As a new article of manufacture, a rope ladder comprising a plurality of flexible supporting members, a plurality of rungs having enlargements thereon which are bored from the upper surface thereof to provide passages therethrough for the supporting members and which are counterbored from the under-surface thereof to provide predeterminedly shaped recesses therein, and a plurality of plug elements adapted to be secured in said recesses on said supporting members to prevent the rungs from slipping with respect to said supporting members and to hold the same in predeterminedly spaced relation therealong.

14. The structure as recited in claim 13 characterized in that means are secured to said rungs at said enlargements to prevent the rungs from contacting with the wall along which the ladder extends.

15. As a new article of manufacture, a flexible rope ladder comprising a plurality of flexible supporting members, a plurality of solid rungs having enlargements thereon and recesses formed therein adjacent the under-surface of said enlargements, and means including a plurality of plug elements formed on said supporting members and disposed in said recesses for securing said rungs to said members.

16. The structure as recited in claim 15 characterized in that an abutting spacer member is mounted on each of the enlargements to prevent the rungs from contacting with the wall along which the ladder extends.

17. As a new article of manufacture, a rope ladder comprising a plurality of flexible supporting members, a plurality of rungs having enlargements thereon which are bored from the upper surface thereof to provide passages therethrough for the supporting members and which are counterbored from the under-surface thereof to provide predeterminedly shaped recesses therein, a plurality of plug elements disposed in said

recesses on said supporting members, means secured to said rungs at said enlargements to prevent the rungs from contacting with the wall along with which the ladder extends, and means passing through said last mentioned means and into said enlargements and through the plug elements and the supporting members to prevent the rungs from slipping with respect to the said supporting members and to hold the same in predeterminedly spaced relation therealong.

In testimony whereof I have hereunto set my hand this 24th day of March, A. D. 1930.

HENRY HOCH.