May 19, 1959 R. L. McGUIRE 2,887,261

COLLAPSIBLE FIRE ESCAPE LADDER

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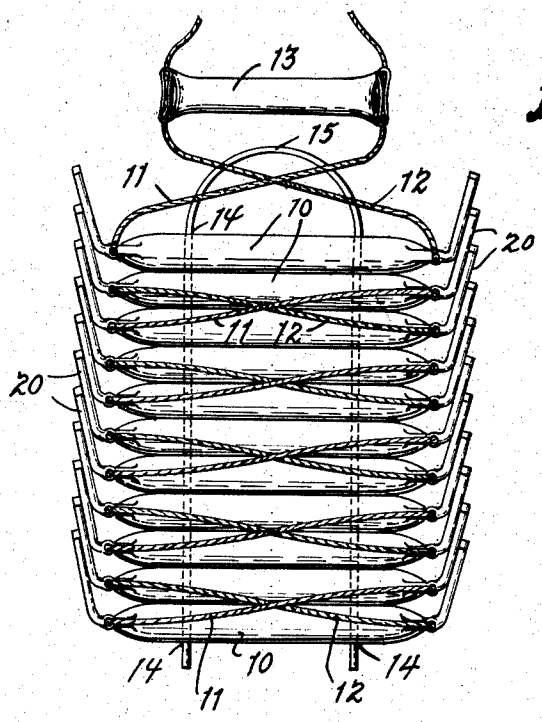


Fig. 1.

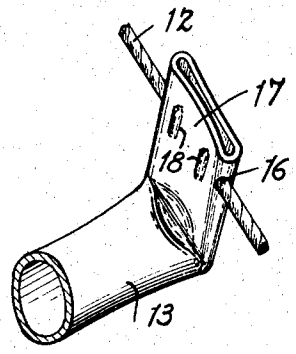


Fig. 2.

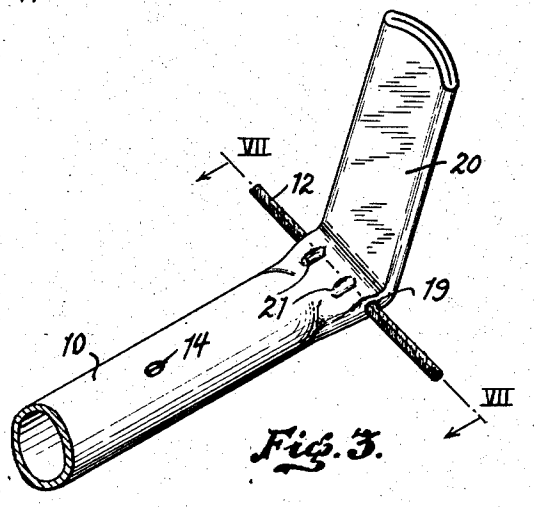


Fig. 3.

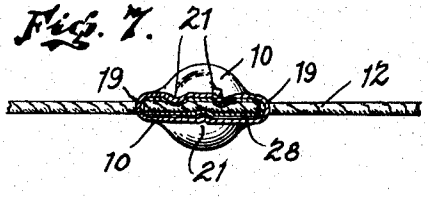


Fig. 7.

INVENTOR.
ROY L. McGUIRE.
BY
W. H. Atkinson
ATTORNEY

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Fig. 4.

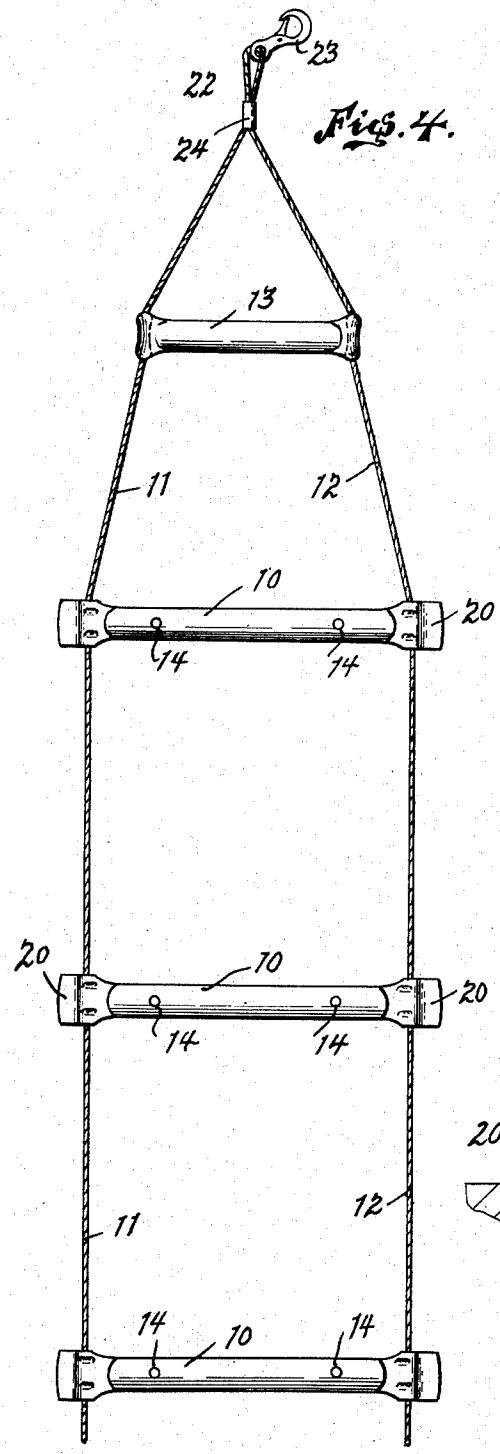


Fig. 5.

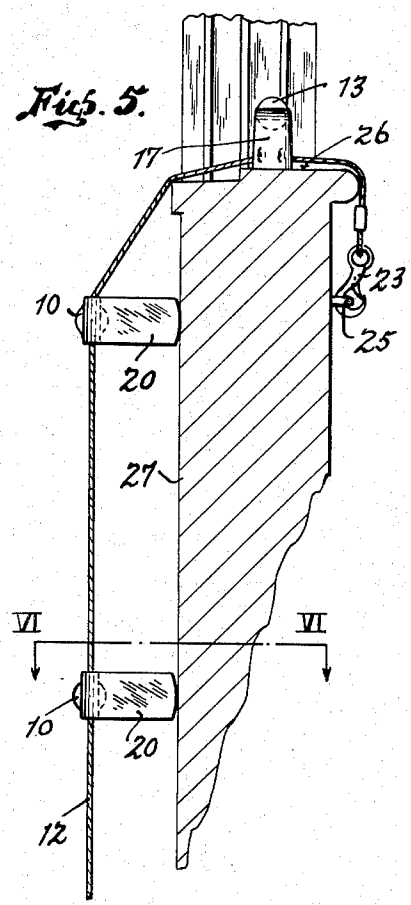
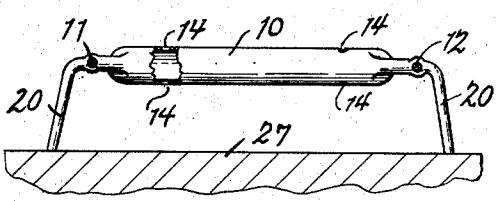


Fig. 6.



INVENTOR.
ROY L. McGUIRE.
BY
W. H. Atkinson
ATTORNEY

United States Patent Office 2,887,261 Patented May 19, 1959

2,887,261

COLLAPSIBLE FIRE ESCAPE LADDER

Roy L. McGuire, San Francisco, Calif.

Application November 15, 1957, Serial No. 696,651

3 Claims. (Cl. 228—40)

My present invention relates to ladders and more particularly to an emergency fire escape ladder for use in homes and like buildings and has for one of its objects the provision of an emergency fire escape ladder of improved and practical construction that may be collapsed in a novel manner and when not in use stored at any desired or convenient point within a room with a minimum of space requirement.

A further object of the invention is to provide a fire escape ladder having a plurality of metallic rungs with wall engaging stays extending at oppositely disposed angles from the ends thereof and in which the rungs of the ladder are carried in spaced relation between two suspension cables with the spacing thereof at such a dimension that said rungs may be turned end for end with respect to each other by a twisting of the suspension cables and nested in a common plane for storage.

Another object of the invention is to provide a novel means for effectively and securely attaching the tubular rungs of the ladder in fixed positions upon the rung supporting cables.

Another object of the invention is to provide a collapsible ladder of the type having rungs suspended in spaced relation by supporting cables that may be collapsed by reversing the rungs end for end with a twist in the suspension cables and having means operating in conjunction with the twist in the supporting cables for retaining the rungs of the ladder in nested relation in a common plane for storage.

Other objects and advantages will be in part evident to those skilled in the art and in part pointed out hereinafter in connection with the accompanying drawing, wherein there is shown by way of illustration and not of limitation a preferred embodiment of the invention.

In the drawing wherein like numerals refer to like parts throughout the several views:

Figure 1 is a view showing a ladder constructed in accordance with the invention as folded and secured for storage,

Figures 2 and 3 are fragmentary views showing details of construction,

Figure 4 is a fragmentary view showing the upper portion of the ladder as unfolded for use,

Figure 5 is a fragmentary sectional view showing the manner in which the ladder is disposed over and suspended from the sill of a conventional window opening,

Figure 6 is a fragmentary sectional view taken along lines VI—VI of Figure 5, and

Figure 7 is a fragmentary view showing a further detail of construction.

As shown in Figure 1 of the drawings, a novel feature of the fire escape ladder here proposed resides in the fact that when in use the rungs of the ladder are suspended and secured at the ends thereof in spaced relation between vertically extending supporting cables and the arrangement is such that the complete assembly can be folded, as here shown, for storage with a minimum of space requirement when not in use.

As illustrated, the rungs of the ladder, designated by the numeral **10**, are formed of tubular material preferably a light steel and are supported between two spaced suspension cables **11** and **12**. These two cables **11** and **12** may be formed as the depending ends of a continuous length of cable which, as will be hereinafter pointed out, is provided with a loop by which the lengths of cable **11** and **12** may be secured to a fixed point within a room and adjacent a window through which escape may be desired. Between the upper rung **10** of the ladder and said securing loop the cables **11** and **12** also carry a hand grip member **13** which will act as an assist in approaching the upper rung of the ladder when in use. In addition to their attachment at the ends upon the suspension cables **11** and **12**, each of the tubular rungs **10** also have two uniformly spaced holes **14** that extend in a direction at a right angle to the direction in which the lengths of cable **12** are threaded through the rungs. When nested as here shown, these holes **14** in the rungs **10** are adapted and arranged to align and register with each other throughout the series of rungs and accommodate a U-shaped or hairpin-like member **15** which in association with the crossed or twisted cables **11** and **12** between the successive rungs **10**, will serve to retain the collapsed assembly as a substantially rigid unit.

As illustrated in Figure 2 of the drawings, the hand grip member **13** is also of tubular material and at its ends, it is drilled as at **16** for the passage of one of the lengths of cable **11** or **12** therethrough. After drilling the ends of the member **13** are flattened as at **17** and finally crimped upon the length of cables **11** and **12** by cooperating indentations **18** at opposite sides thereof in a manner to be more particularly pointed out hereinafter.

In like manner as shown in Figure 3 of the drawings, the rungs **10** of the ladder are drilled as at **19** for the passage of the suspension cables **11** and **12** therethrough and outwardly from the holes **19** the extending ends of the tubular rungs **10** are flattened and bent at an angle to provide a spacing strut or stay **20** which will position and hold the rungs **10** outwardly from a wall or other vertical surface against which the extended ladder may be hung. In this instance, as in the case of the hand grip member **13**, the rungs **10** are provided with cooperating indentations **21** at the opposite sides thereof. It will be also here noted that the accommodating holes **14** provided for the U-shaped or hairpin-like rung retaining member **15** extend through the rungs **10** in a direction at a right angle to the supporting cables **11** and **12**.

In Figure 4 of the drawings, there is shown the upper portion of a ladder constructed as above in which the two rung supporting cables **11** and **12** are formed from a single length of cable that is doubled back to provide a loop **22** to which a snap hook **23** is attached. This loop **22** is formed and maintained by an encircling band **24** that is compressed about the cables **11** and **12** at this point. It will be also noted that the hand grip member **13** is of a shorter length than are the rungs **10** and when suspended over a window sill the individual cables **11** and **12** will assume a substantially uniformly tensioned condition that will insure a horizontal disposition of the rungs **10** when the ladder is in use. When the completed ladder is provided with the snap hook **23** and the hook is secured within a room adjacent a window, as for example by connection with a fixed eye bolt **25**, the ends of the off-set portions **17** of the hand grip member **13** will be drawn into firm engagement with the sill **26** of a window. As a result the hand grip portion **13** will be held in an elevated position where it may be easily grasped by a user. At the outer side of the sill **26** the off-set ends **20** of the uppermost rung **10** will engage the wall **27** with which the sill **26** is associated and thus sus-

pend the succeeding lower rungs of the ladder in a substantially vertical line and as the lower rungs **10** are engaged by a party using the ladder the off-set ends **20** of each of these rungs will function to maintain the rungs in outwardly spaced relation from the wall **27**, as is clearly illustrated in Figure 6 of the drawings.

In Figure 7 of the drawings, there is illustrated in more detail the manner by which the rungs **10** are secured at their ends between the suspension cables **11** and **12**. As here shown a short sleeve of aluminum or other comparable soft metal tubing **28** is positioned within the partially collapsed tubing and in alignment with the cable accommodating holes **19** and the lengths of cable **11** and **12** are then threaded through the holes **19** of the rungs and also through these short lengths of tubing **28** prior to a final and further flattening of the rungs **10** at this point.

Since the hand grip member **13** will not be subjected to the same stresses and strains as the rungs **10**, the matter of securing the flattened portions **17** against displacement along the cables **11** and **12** may not require the use of the sleeves of tubing **28** and therefore this portion may be effectively secured in place by simply crimping the ends thereof upon the suspension cables. However, in the case of the rungs **10** which, as distinguished from the hand grip member **13**, will be subjected to the weight of a user of the ladder, the manner of attaching these rungs to the cable and securing them against axial movement or displacement therealong is more important. At this point and within the flattened ends of the rungs **10** and as indicated in this latter figure of the drawings, I provide the short lengths of a softer metal tubing **28** within the flattened ends of the rungs **10** through which the suspension cables **11** and **12** are threaded. These lengths of tubing **28** have an inside diameter substantially conforming with the outer diameter of the cables **11** and **12** and an outside diameter greater than that of the holes **19** of the rungs **10** through which the cables **11** and **12** pass. To accomplish this assembly after drilling the tubular rungs **10** for the holes **19** the ends thereof are flattened partially and only to such a degree as will permit the insertion of the tubular members **28** at the ends thereof into a position in alignment with the holes **19**. After the cables **11** and **12** are threaded through the holes **19** and through the aligned tubular member **28** the surrounding portion and the ends of the rungs **10** are flattened further and finally indented as at **21**, as indicated in Figure 3 of the drawings, to effectively position and secure the rungs **10** against axial displacement along the cables **11** and **12** under all normal conditions of use.

While I have, for the sake of clearness and in order to disclose my invention so that the same can be readily understood, described and illustrated a specific form and arrangement, I desire to have it understood that this invention is not limited to the specific form disclosed, but may be embodied in other ways that will suggest themselves to persons skilled in the art. It is believed that this invention is new and all such changes as come within the scope of the appended claims are to be considered as part of this invention.

Having thus described my invention what I claim and desire to secure by Letters Patent is:

1. In a collapsible fire escape ladder, the combination of two spaced rung supporting cables having means at their upper ends for attachment to and suspension from a fixed point when in use, a plurality of rungs secured in vertically spaced relation between said supporting cables, said rungs having a length substantially corresponding with the length of the supporting cable between successive rungs and having spaced apertures extending substantially horizontally therethrough when said ladder is in use position, whereby the rungs of said ladder may be disposed in a common plane and with said apertures in alignment by a successive end for end reversal of said rungs with respect to an adjacent rung and an overlapping of the connecting lengths of cable between the adjacent rungs, and means passing through the apertures in said rungs for retaining said rungs in said common plane when reversed.

2. In a collapsible fire escape ladder of the character described, the combination of a pair of rung supporting cables adapted when in use to support a plurality of vertically spaced horizontally extending ladder forming rungs, a plurality of rungs secured at their ends between said cables, the length of said rungs between their points of attachment to said cables being substantially equal to the spacing of said rungs along said cables, whereby said rungs may be turned end for end by a twist in said cables and nested in a common plane in contact with each other, said rungs having spaced apertures intermediate the ends thereof which register with each other when said rungs are turned end for end and arranged in contact with each other in said common plane, and means passing through the apertures of said rungs operating in cooperation with the twist in said cables to retain the rungs of said ladder in said nested condition.

3. In a collapsible fire escape ladder of the character described, the combination of a pair of rung supporting cables adapted when in use to support a plurality of vertically spaced horizontally extending ladder forming rungs, a plurality of rungs secured at their ends between said cables, the length of said rungs between their points of attachment to said cables being substantially equal to the spacing of said rungs along said cables, whereby said rungs may be turned end for end by a twist in said cables and nested in a common plane in contact with each other, said rungs having spaced apertures intermediate the ends thereof which register with each other when said rungs are turned end for end and arranged in contact with each other in said common plane, and a U-shaped member having extending ends passing through the apertures of said rungs operating in cooperation with the twist in said cables to retain the rungs of said ladder in said nested condition for storage.

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