Sept. 10, 1963 C. C. SCRUBY 3,103,258

LADDER

Filed Jan. 11, 1960 4 Sheets-Sheet 1

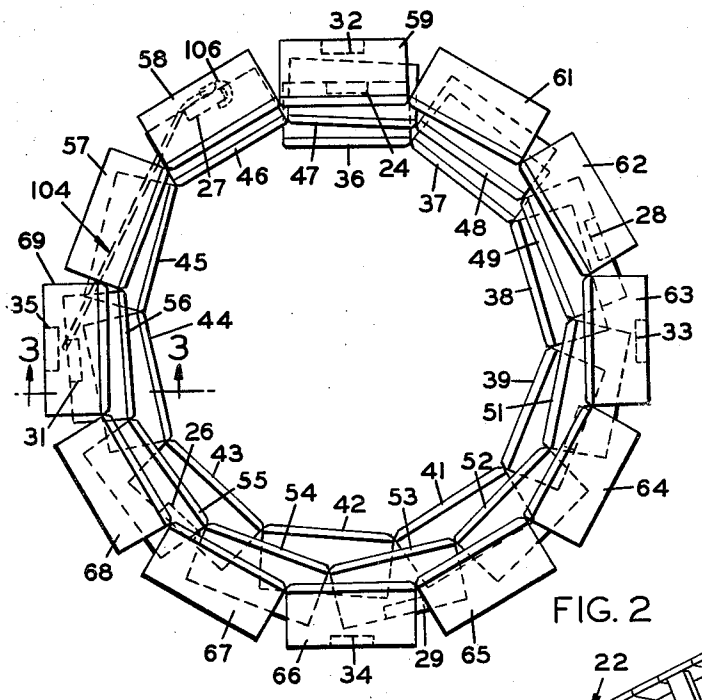


FIG. 2

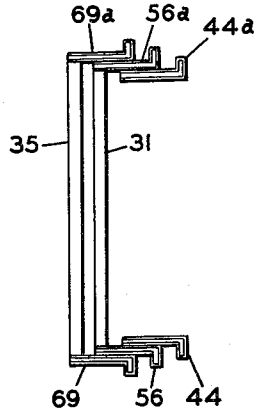


FIG. 3

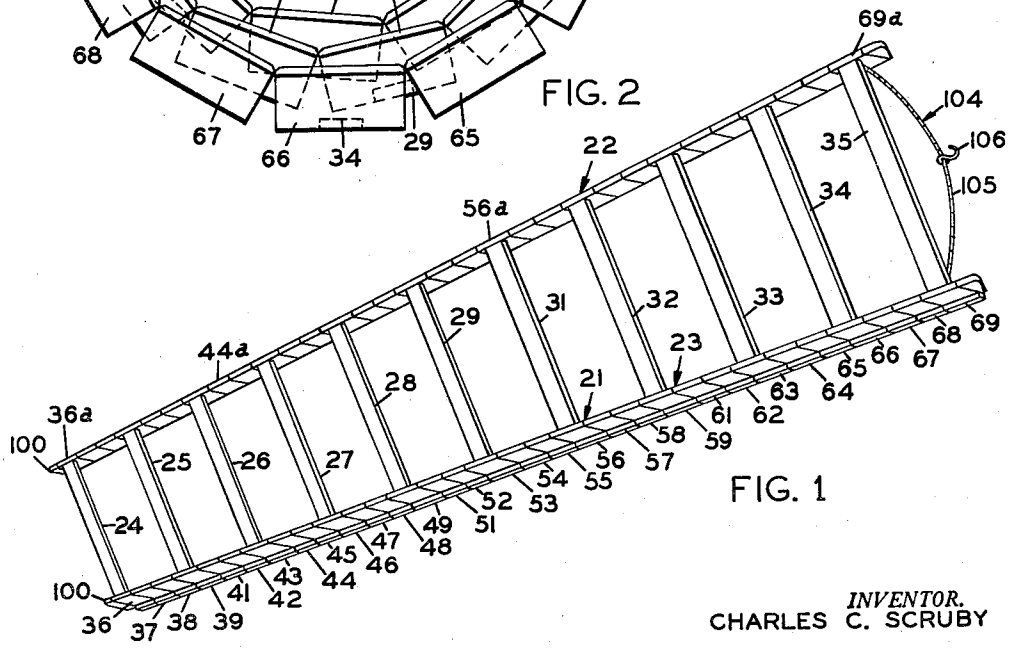


FIG. 1

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LADDER

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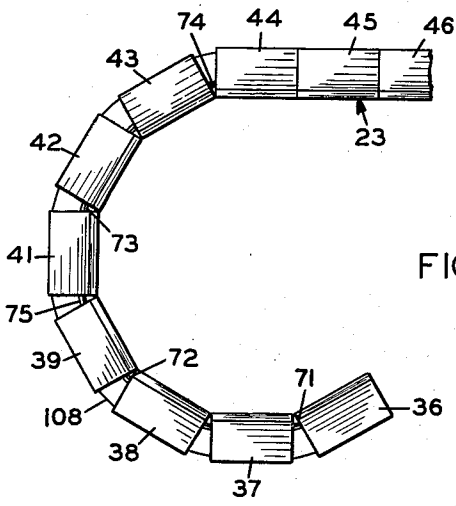


FIG. 4

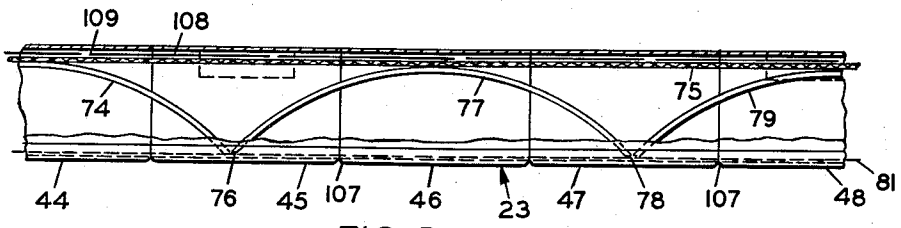


FIG. 5

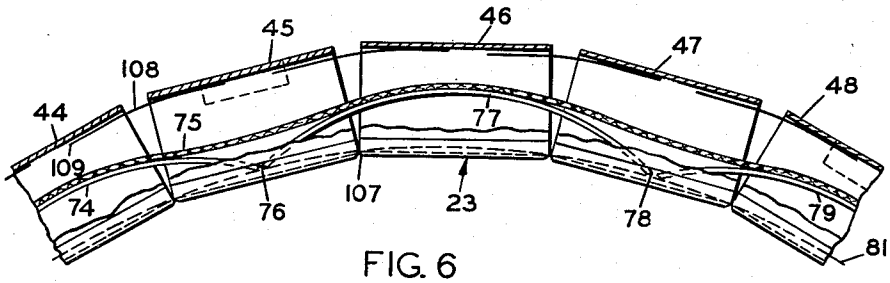


FIG. 6

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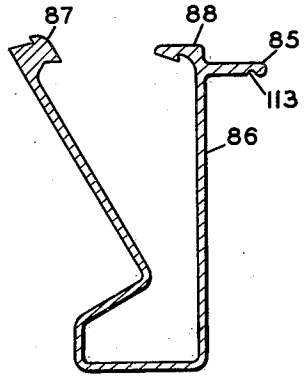


FIG. 7

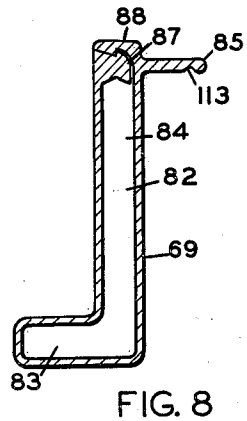


FIG. 8

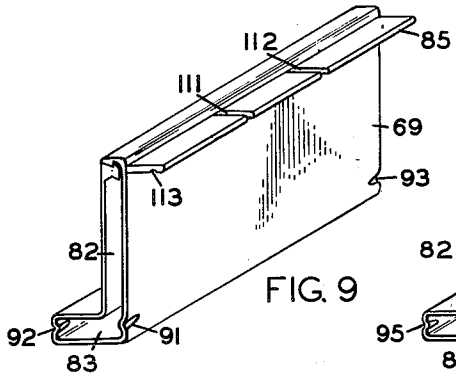


FIG. 9

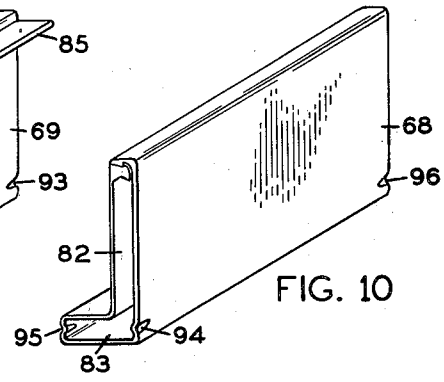


FIG. 10

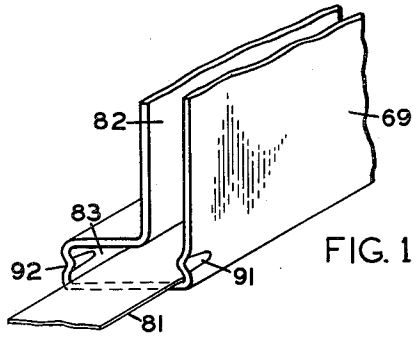


FIG. 11

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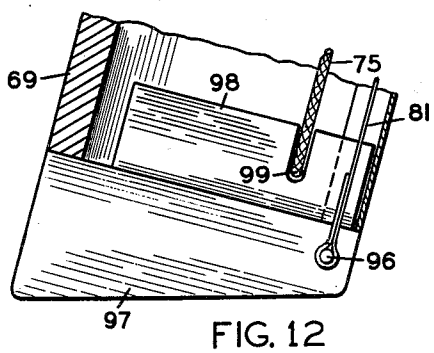


FIG. 12

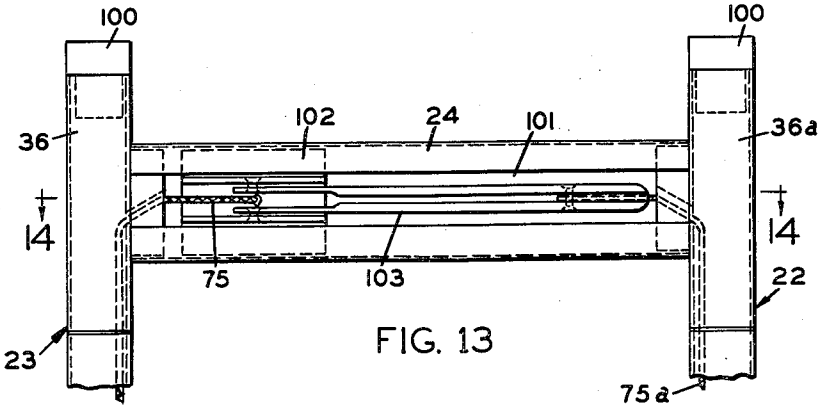


FIG. 13

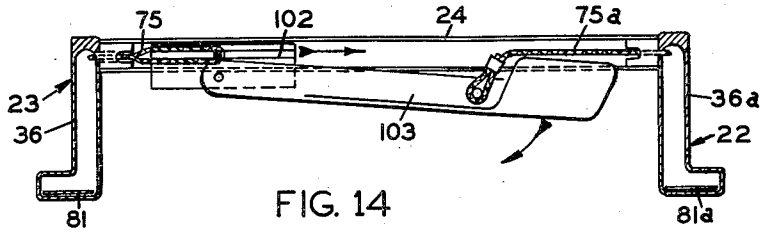


FIG. 14

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United States Patent Office 3,103,258 Patented Sept. 10, 1963

3,103,258

LADDER

Charles C. Scruby, Carmi, Ill., assignor, by mesne assignments, to Ladders, Inc., Carmi, Ill., a corporation of Delaware

Filed Jan. 11, 1960, Ser. No. 1,523
12 Claims. (Cl. 182—163)

The invention disclosed and claimed in this application relates to roll-up or collapsible ladders of the general type shown in my copending patent application Serial No. 831,430, filed August 3, 1959, now Patent No. 3,070,-188, issued December 25, 1962, but the embodiment disclosed herein constitutes improvements on the embodiment disclosed in my said prior application.

One of the objects of the present invention is the provision of a roll-up ladder constructed primarily of lightweight metal or other suitable lightweight material.

A further object of my invention is the provision of a collapsible ladder in which the rails are constructed of a plurality of hollow blocks.

A further object of my invention is the provision of a flexible tape or other flexible loadbearing tensile element associated with such a ladder, on which the blocks are mounted, and by which the blocks are held in contact with each other.

A further object of the invention is the provision of such an improved type of collapsible ladder in which a cable or other tension element is provided for holding the ladder in its extended or operative position.

A further object of my invention is the provision of such a ladder in which the tension element by which the ladder is held in its extended or operative position is substantially enclosed within the rails of the ladder.

A further object of my invention is the provision of means for automatically shifting the aforesaid tension member within the rails of the ladder from a position adjacent to the front of the rail when the ladder is in its extended or operative condition to a position adjacent to the rear of the rail when the ladder is in its rolled up condition.

A further object of my invention is the provision of means whereby the difference between the length of the path of the tension member in the extended position and the length of the path of the tension member in the roll-up position is minimized.

A further object of my invention is the provision of an improved take-up lever mechanism.

A further object of my invention is the provision of means contained within the hollow of the rail members whereby such means controls both the position of the tension member when the ladder is rolled up and when the ladder is in its extended position.

A further object of my invention is the provision of a plurality of L-shaped hollow blocks which form the rails of a ladder, of the aforesaid type.

A further object of my invention is the provision of a ladder formed of rails and rungs and of which the rails are formed of hollow L-shaped blocks.

Further objects and features of my invention will be apparent from the subjoined specification and claims when considered in connection with the accompanying drawings illustrating an embodiment of my invention.

In the drawings:

The drawings illustrate an embodiment of my invention. Therein:

FIG. 1 is a view in perspective of a ladder constructed according to the embodiment of my invention;

FIG. 2 is a view in side elevation of the ladder of FIG. 1 shown rolled up and also showing some hidden outlines in dotted lines;

FIG. 3 is a fragmentary view in horizontal section taken substantially on the line 3—3 of FIG. 2;

FIG. 4 is a fragmentary view in side elevation showing one end of a side rail partially rolled up at the beginning of the operation of rolling up the ladder;

FIG. 5 is a view on a larger scale than FIG. 4 and in vertical section showing a fragment of the ladder, showing the inner blocks thereof, and showing especially the arches by which the tension member is moved from its loosened position to its tensioned position and by which the tension member is held in tensioned position while the ladder is in operative condition;

FIG. 6 is a view in section similar to FIG. 5 showing a position of the arches and of the tension member as the ladder is partly rolled up in the beginning of the operation of rolling up the ladder;

FIG. 7 is a view in section of a metal extrusion from which blocks forming the rails of the embodiment may be made;

FIG. 8 is a view similar to FIG. 7 showing in vertical section the extrusion of FIG. 7 after it has been changed to a locking situation in which the block is fully formed;

FIG. 9 is a view of one of the blocks in perspective;

FIG. 10 is a view of another block in perspective;

FIG. 11 is a fragmentary view showing a portion of an end of one of the blocks such as is shown in FIG. 9 and showing positioned within the hollow thereof the main flexible loadbearing tensile element or metallic tape on which the individual blocks are mounted and by which the blocks are held in contact and at times in abutment;

FIG. 12 is a view of the lowermost block of the ladder with the supporting plug positioned therein and showing one of the main metallic tapes and one of the tension members connected to such plug;

FIG. 13 is a fragmentary view in elevation of the upper end of the ladder showing partially in dotted lines the tensioning cables and their relationship to the top rung of the ladder;

FIG. 14 is a view in section taken on the line 14—14 of FIG. 13 and illustrating details of the take-up mechanism by which the tensioning cables are tensioned when it is desired that the ladder be extended for operation and by which the tensioning cables are loosened when it is desired that the ladder be rolled up to the condition shown in FIG. 2.

I will point out here that the ladder is formed of a pair of rails tapering toward each other from the bottom to the top and connected by rungs of varying lengths having the widest at the bottom and narrowest at the top. Each rail is made up of a plurality of hollow L-shaped light metal (which might be plastic or other suitable lightweight material) blocks. Certain of the blocks are runged blocks and others are unrunged blocks. Thus the rungs are connected to certain of the blocks, but between the runged blocks there are intermediate blocks which increase the flexibility of the ladder to a point to which it is practical to use it, inasmuch as if there were not intermediate blocks it would become impossible to roll the ladder tightly enough to reduce its size sufficiently for portability. The L-shape of the blocks and the taper of the ladder contribute also to this same purpose.

The blocks are hollow, and through the hollow there extend a pair of flexible members. My ladder does not use hinges to connect the blocks. The blocks are strung on these flexible members like beads on a string, and hinges are not necessary or desirable. The cost of hinges is thus eliminated. Also the possibility of a single weak joint destroying the strength of the ladder is eliminated by using a continuous homogenous strip of uniform high strength. One of these flexible members (i.e. the flexible

metal tape) I designate herein as the main flexible load-bearing tensile element, and the other (which is illustrated as a cable) I designate as a tension member.

The main tensile element always remains in the wide portion of the hollow of the L-shaped blocks but the tension member is narrower, and automatically moves from a position adjacent to the wide portion of the hollow to a position at the opposite end of the blocks as the ladder is straightened. This enables the use of a tension member (i.e. locking tension member) which is only slightly longer than the main tensile member but does not have to be disconnected from the end block as would be necessary were it attempted to roll a ladder not having this feature.

I connect both of my tension means to plugs which I insert in the lowermost blocks. The main load bearing tensile elements are also connected to plugs in the topmost blocks. I use a take-up lever (connected to the top ends of locking tension member) near the top of the ladder for tightening said locking tension member when the ladder is in its straight or operative condition. In addition to the tension means of our ladder, aligners are provided between the blocks.

I provide means in the hollow of the ladder for moving the tension means (e.g. cable) automatically from the wide end of the hollow blocks to the narrow end. Thus when the take-up lever is released, the tension means is slacked. This allows the ladder to be slightly curved as shown in FIG. 6. This automatically moves the tension means (e.g. cable) closer to the metallic tape (i.e. main tensile means) and loosens it further thus eventually allowing complete roll-up. This progressive slackening of the cable as the ladder is rolled has the additional advantage of preventing kinking of the cable. When the ladder is straightened, the reverse action takes place so that when completely straight a very slight tightening of the tension means (e.g. cable) by the take-up lever makes the cable completely taut and locks the ladder firmly against bending.

Referring again to the drawings, it may be seen that I have shown in FIG. 1 a ladder **21** composed of side rails **22** and **23** connected by rungs **24**, **25**, **26**, **27**, **28**, **29**, **31**, **32**, **33**, **34** and **35**. The rail **23** is made up of hollow blocks **36–39** inclusive, **41–49** inclusive, **51–59** inclusive, and **61–69** inclusive. Similarly, the rail **22** is made up of hollow blocks **36***a* to **39***a* inclusive, **41***a* to **49***a* inclusive, **51***a* to **59***a* inclusive, and **61***a* to **69***a* inclusive. However, in the drawings the designation of all of the blocks of the rail **22** excepting **36***a*, **44***a*, **56***a*, and **69***a* are omitted for clarity.

In FIG. 4 the blocks **36** to **39** inclusive and **41–46** inclusive are shown on a smaller scale and there is included also the arches **71**, **72**, **73** and **74**. Resting on and guided by these arches is a cable or tension member **75**. A portion of the rail **23** is shown also in FIG. 5 in section and on a larger scale than in FIG. 4. There is shown the blocks **44**, **45**, **46**, **47** and **48**. The arch **74** extends from the block **43** through the block **44** and approximately to a midpoint **76** of the block **45**. An arch **77** extends approximately from the point **76** out of the block **45**, through the block **46** and into the block **47** approximately to the point **78**. Extending approximately from the point **78** is an arch **79** which extends out of the block **47**, through the block **48** and into the block **49**. Dimples may be provided, if desired, to prevent the arches from shifting too far. Thus similar arches are positioned in each group of three blocks throughout the ladder. They are positioned in the narrow of the hollow of the block and when the ladder is in its operative or extended position as shown in FIG. 5, they hold the cable **75** in the extreme front edge of the narrow portion of the hollow of the block. It will be noted by reference to FIG. 4 that when the ladder is rolled as in the condition of FIG. 2, the arches and the cable **75** follow quite closely

the curve formed by the wide portion of the block and the tensile element or metallic tape. The arches (**74**, **77**, **79**, etc.) thus at times automatically move the cable **75** to its desired position for holding the ladder extended and at other times automatically permit the cable **75** to be moved to its desired position for allowing it to be rolled. When the ladder is in the extended position as shown in FIGS. 1 and 5, the cable **75** is in the opposite portion of the narrow part of the hollow of the block from the metallic tape or tensile member. The condition shown in FIG. 6 is inttermediate the condition shown in FIGS. 4 and 5. It will be noted that in FIG. 6 the cable is slack because the take-up means has been released. It will also be noted that while the cable **75** in FIG. 6 is not perfectly straight from end to end of the ladder, yet it has not completely assumed the approximately circular condition that it assumes when the ladder is rolled up as shown in FIG. 2. The metallic tape or flexible tensile element **81** on which the blocks are mounted and by which the blocks are held in contact is the main load-bearing element and is shown in FIGS. 5 and 6. It is shown more clearly in FIG. 11 to which reference will be made later.

All of the blocks are similar in design. In FIG. 8 there is shown in cross section block **69** which, as indicated, has an L-shaped hollow **82** of which the lower portion **83** is wide and the upper portion **84** is relatively narrow. It is formed with a projection **85** having slots **111** and **112** to which the hollow rungs are secured by depressing rung sections into the dimples **113** of projection **85**. It is originally formed as a hollow sheet of light metal shown in FIG. 7 as **86** which after extrusion is pressed together so that the nose **87** latches with the catch **88** and forms a completed L-shaped hollow block which will not under normal conditions be opened. In FIG. 9 the block **69** is shown in perspective. It may be noted that the dimples **91**, **92** and **93** shown are provided for the purpose as indicated in FIG. 11 of holding the tape **81** securely in place. A similar dimple opposite the dimple **93** in the position corresponding to the position of the dimple **92** is also provided. The block **68** shown in FIG. 10 is similar to the block **59** and is provided with dimples **94**, **95**, **96**, and the corresponding dimple opposite **96**, but does not have a slotted projection corresponding to the projection **89** inasmuch as the block **68** is not used for the purpose of connecting a rung. However, if desired, for the purpose of uniformity in manufacture and for the purpose of adding strength to the blocks, slotted or unslotted projections such as **85** could be formed on all of the unrunged blocks as **65**, **67**, **68**, etc.

The tape **81** extends through all of the blocks of rail **23** and a similar tape extends through all of the blocks of rail **22**. It is held always in the wide portion of the L of the hollow and is confined at the ends by the dimples **91**, **92**, **93**, **94**, **95**, **96**, etc. in the lowermost portion of **83**. It gives resiliency to the ladder by its flexibility, it allows the rolling of the ladder, and it holds the blocks substantially in contact with each other. The tape **81** eliminates the need of hinges, and thus saves costs tremendously. It gives uniform strength throughout. It causes a natural rolling of the ladder as distinguished from a folding at individual hinges. The tape **81** absolutely prevents the ladder from ever curling or curving or bending in the direction opposite to that in which it rolls, and thus when the ladder is placed against a building, for instance, it can never give in the direction toward the building.

As shown in FIG. 12, the tape **81** is secured as at **96** to the base element **97** which is inserted in the lower block **69**. A similar base element is inserted in the lower block **69***a*, and the tape of rail **23** is secured to such base element. The base element **97** has a projection **98** which extends up into the hollow of the block **69** and has a provision as at **99** for securing the lowermost end of the

cable 75. Similar top plugs 100 are provided for each of the rails 22 and 23. However, the plugs 100 need not, and do not, have the inclined edge and do not have the cables 75 and 75a secured thereto.

The rung 24 is formed with a slot such as the slot 101 shown in FIG. 13. Within the slot 101 there is inserted a block 102 which has pivotally connected thereto a lever 103. The block 102 (adjacent the lever 103 is connected to the cable 75 which extends through the rail 23. Adjacent the outer end of the lever 103 there is pivotally connected to it a cable 75a which corresponds to the cable 75 and extends throughout the rail 22. Thus when the parts are in the position shown in FIGS. 13 and 14, both the cables 75 and 75a are relatively loose and move to the position shown in FIG. 6, permitting the ladder to be rolled. However, if the lever is rotated clockwise from the position shown in FIGS. 13 and 14 (as indicated by the arrow in FIG. 14), both the cable 75 and the cable 75a will be tightened so that the cable 75 (and 75a) will reach the position shown in FIG. 5 and the ladder will be held in its extended operating condition. In such operation, the block 102 moves toward rail 22 (to the right as shown in FIG. 14) thus tightening the cable 75. Secured at opposite ends of the rung 35 is a means 104 for holding the ladder in the rolled up condition indicated in FIG. 2. This means consists of a resilient band 105 and a hook 106. When the ladder is rolled, the band is stretched and the hook secured to the next adjacent rung as for example 27. When the hook is released, the band normally conforms to the back of the rung 35, but it is shown in FIG. 1 as drooping slightly for the purpose of illustration. The blocks as shown in FIGS. 5 and 6 are bevelled slightly as at 107. This bevel is omitted in other views, but it is to be understood that all of the blocks are bevelled. The purpose of the bevel is to insure that the tensile means 81 will be flexed at the joints rather than sharply bent.

Aligners 108 are provided between each pair of blocks. They are secured to one of the pair of blocks and extend into the other. For example, an aligner 108 is shown secured at 109 in block 44 and extends into block 45.

Operation

Assuming that the ladder is in the rolled up condition shown in FIG. 2, the hook and band 104 are released and the ladder is unrolled or allowed to unroll preferably on some level surface such as the ground. The lever 103 is then turned in a clockwise direction causing the block 102 to move to the right as shown in FIG. 14 in the direction of the arrow, thus tightening the cable 75. At the same time, movement of the lever 103 pulls on the cable 75a thus tightening the cable 75a. The cables thus oppose each other so that both of the cables are tightened in the manner indicated. The straightening of the ladder has caused the arches (i.e. the arches 71, 72, 73, 74, 76, 79, etc.) to assume a position in which they hold the cable 75 in the position shown in FIG. 5. The similar arches in the rail 22 cause the cable 75a to assume a corresponding position. Movement of the lever 103 in a clockwise direction tightens both cables and pulls all of the blocks into fully abutted end-to-end alignment and holds the blocks firmly locked in such position. Thus the ladder is a rigid unit and may be handled as a conventional ladder. The tapes corresponding to the tape 81 prevent the ladder at all times from bending or curving in the direction opposite to that shown in FIGS. 2, 4 and 6. When it is desired to store the ladder or to roll it up so that it may be easily transported, the lever 103 is rotated in a counterclockwise direction thus allowing the block 102 to slide to the left as shown in FIG. 14 and loosening the cables 75 and 75a. The cables being loose, the ladder may be bent in the direction shown in FIG. 6, the cable riding in the groove in the upper part of the arches and conforming to the shaped position of the arches as the ladder is rolled. When the ladder is rolled, the portions of the tape between the dimples of each individual block are free to rise to the top of the lower portion 83 of the L-shaped hollow. Thus the strap is free to curve throughout its length instead of bending sharply at the joints between blocks. It may be noted that when the ladder is in the straight position, the cables 75 and 75a are removed a substantial distance from the tape 81 and therefore the force tending to stretch these cables which would allow the ladder to bend is minimized; yet when the ladder is bent, the cable drops down until the radius of its arc is substantially that of the radius of the tape so that a slight loosening of the cable allows the ladder to be rolled up into a compact bundle which may be easily carried.

Thus the cable does not have to be detached from the lever mechanism or from the ladder to provide sufficient slack for rolling. In this respect (as well as others) the ladder of this disclosure is an improvement over the ladder disclosed in my copending application Serial No. 831,430.

In the manufacture and assembly of my ladder, metal sheets are extruded in the form shown in FIG. 7. These are cut off in appropriate lengths to form the blocks. The blocks are formed by bending the nose 87 until it is locked with the latch 88 forming the individual hollow open ended blocks such as are shown in FIGS. 9 and 10. These blocks are assembled end-to-end in any desired lengths, and rungs such as the rungs 24–29 and 31–35 inclusive are assembled with the individual blocks. I prefer to assemble rungs with every third block, leaving two blocks in between, so that the ladder has desired flexibility. However, one block, or three or more blocks, might be interposed between runged blocks. The more intermediate blocks used, the greater will be the flexibility of the ladder.

The projection 85 is shaped so that the rungs may be locked in place by dimpling into the recess 113. The tape 81 and the corresponding tape in the rail 22 are inserted through all of the blocks of each rail, and the cables 75 and 75a are also inserted through the blocks of each rail. The tapes (e.g. the tape 81) and the cables 75 and 75a are secured to the supporting plugs (e.g. the plug 97) at the bottom of the ladder. Securing the cable 75 at the point 99 actually lengthens the path of the cable in the straight condition of the ladder and shortens the path in the rolled condition, thus further decreasing the difference between the length of the cable and length of the tape, thus decreasing the amount of take-up necessary. Only the tape is attached to the plug at the top of the ladder, the cables being attached to the block 102 and lever 103 (FIGS. 13 and 14). The ladder is then ready to be rolled up for transportation or to be used in this condition in operation.

It is to be understood that the above described embodiments of my invention are for the purpose of illustration only and various changes may be made therein without departing from the spirit and scope of the invention.

I claim:

1. A roll-up ladder comprising a pair of rails each comprising a plurality of hollow blocks; a tensile element positioned in the hollow of the blocks of each of said rails on which the blocks are mounted and with which they flex when the ladder is rolled; a tension member positioned in the hollow of each of said rails, and means for shifting the tension member from one side of the blocks to the other side of the blocks for the holding of said ladder in a rigid position or allowing it to be rolled.

2. A roll-up ladder comprising a pair of rails each comprising a plurality of hollow blocks; a tensile element positioned in the hollow of the blocks of each of said rails; a tension member positioned in the hollow of each of said rails, and means for shifting the tension member from one side of the blocks to the other side of the blocks for

the holding of said ladder in a rigid position or allowing it to be rolled.

3. A roll-up ladder comprising a pair of rails each comprising a plurality of hollow blocks, a tension member within said hollow movable from a position in which it holds the rails in an extended condition to a position in which it allows the rails to be rolled, and means within the hollow of said rails comprising a plurality of arches for controlling the position of the tension member.

4. A roll-up ladder comprising a pair of rails each comprising a plurality of hollow blocks held substantially in contact with each other end to end; a tension member positioned in the hollow of the blocks of each of said rails and operative at times for holding said rails in an extended position; and means for shifting the tension member from one side of the blocks to the other side of the blocks for alternatively locking said ladder in a rigid position or allowing it to be rolled.

5. A roll-up ladder comprising

a pair of rails;

each rail comprising a plurality of hollow blocks held substantially in contact with each other, each of said blocks being L-shaped in cross section and having a relatively narrow hollow substantially horizontal portion and a longer substantially vertical hollow portion, the substantially horizontal section being substantially at right angles to the substantially vertical section;

means in the hollow blocks for holding the block together in substantial contact; and

a separate tension member positioned within the substantially vertical portion of the hollow blocks comprising means for holding the ladder extended in combination with

means, comprising a plurality of arched members positioned in the substantially vertical portion of the L-shaped hollow, for automatically moving the tension member to the extreme end of the substantially vertical portion of the L-shaped hollow of each of the blocks opposite to the substantially horizontal portion of the blocks, each such arched member having at least a portion thereof positioned within the hollows of a plurality of said hollow blocks.

6. A roll-up ladder comprising a plurality of L-shaped hollow metal blocks held substantially in contact end to end, each of said hollow blocks being substantially L-shaped in cross section and having a relatively narrow substantially horizontal section and a longer substantially vertical section, a flexible loadbearing tensile element extending through the substantially horizontal portion of the L-shaped hollow of all of the blocks on which the blocks are mounted, and a narrower tension member positioned in the substantially vertical portion of the L and movable to the extreme end of the substantially vertical portion of the L-shaped hollow of each of the blocks opposite to the substantially horizontal portion of the L hollow and when tightened in such extreme end position, holding the blocks in alignment with each other and the ladder firmly in fully extended straight line condition in combination with means for automatically moving the tension member at times when it is desired to extend the ladder fully, to the extreme end of the substantially vertical portion of the L-shaped hollow of each of the blocks opposite to the substantially horizontal portion of the blocks.

7. A roll-up ladder comprising a plurality of L-shaped hollow blocks held substantially in contact end to end, each having a relatively long hollow leg and a relatively short hollow leg positioned perpendicular to each other so as to form the L shape, a flexible loadbearing tensile member extending through the relatively short hollow leg of all of the L-shaped blocks on which the blocks are mounted, and a narrower tension member positioned in the longer leg of the L of the blocks and movable to the extreme end of the longer hollow of each of the blocks opposite to the shorter hollow leg of the blocks and when tightened in such extreme end position, holding the blocks in alignment with each other and the ladder firmly in fully extended straight line condition.

8. A roll-up ladder comprising a plurality of L-shaped hollow blocks held substantially in contact with each other end to end, each of said blocks having a relatively long hollow leg and a relatively short hollow leg positioned perpendicular to each other so as to form the L shape; a plurality of guides positioned within the hollow blocks, each guide extending into the hollows of a plurality of blocks whereby lateral movement of the blocks relative to each other is prevented, and a flexible tensile element extending through the relatively short hollow leg portion of the L-shaped hollow of all of the blocks on which the blocks are mounted.

9. A roll-up ladder comprising

a pair of rails;

each rail comprising a plurality of hollow blocks some of which are runged blocks and some of which are unrunged spacer blocks;

means for holding the blocks in contact with each other in substantial end to end relationship comprising

a flexible tensile element which is positioned in the hollow of all of the blocks of each of said rails at one side of said rail, on which the blocks are mounted, and on which they flex when the ladder is rolled;

means comprising a tension element also positioned in the hollow of the blocks of each rail at the opposite side of the blocks from the tensile element for holding the rails at times in substantially straight operative condition; and

rungs connecting the runged blocks.

10. A roll-up ladder comprising

a pair of rails each comprising a plurality of L-shaped hollow blocks held substantially in contact with each other end-to-end; some of the blocks of each rail being unrunged spacer blocks and some of the blocks being runged blocks and the runged blocks being formed adjacent to one end with inwardly extending projections, and

a plurality of rungs each secured to a pair of said projections.

11. A roll-up ladder comprising

a pair of rails, each rail comprising a plurality of hollow L-shaped blocks held substantially in contact with each other end-to-end, some of the blocks being unrunged spacer blocks and the other blocks of each rail having projections extending inward from the block and aligned with a corresponding projection from the corresponding block of the other rail, and

a plurality of rungs secured to pairs of said aligned projections and holding the rails of the ladder together.

12. A roll-up ladder comprising

a pair of rails, each rail comprising a plurality of hollow L-shaped blocks held substantially in contact with each other end-to-end, a portion of the blocks of each rail being unrunged spacer blocks and the rest of the blocks of each rail having projections extending inward from one portion of the block and aligned with a corresponding projection from the corresponding block of the other rail; and

a plurality of rungs, each secured to a pair of said aligned projections and holding the rails of the ladder together;

said unrunged spacer blocks being positioned intermediate the blocks having rungs secured thereto, having no rungs secured thereto and being intermediate blocks for providing greater flexibility to the ladder.

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