Jan. 29, 1963 S. BARINGER 3,075,611

RUNGLESS LADDER

Filed Feb. 14, 1962 2 Sheets-Sheet 1

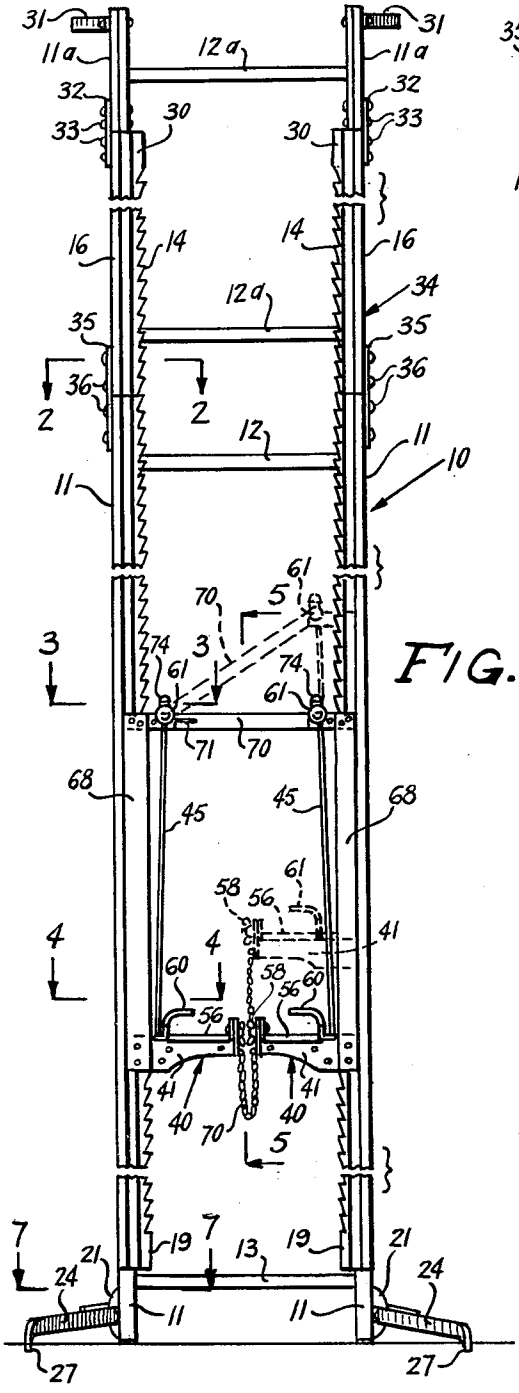


FIG. 1

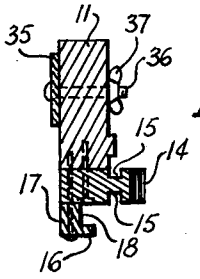


FIG. 2

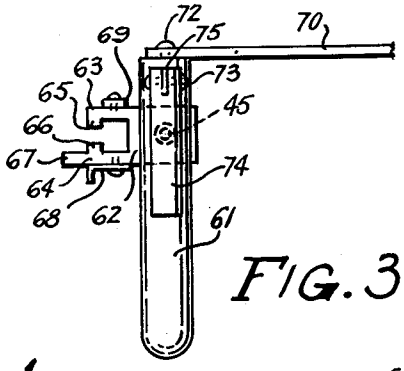


FIG. 3

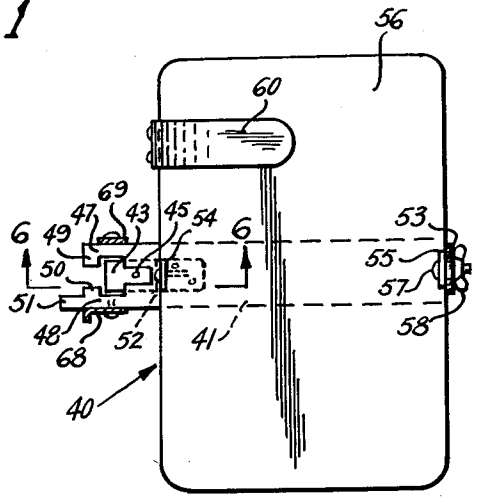


FIG. 4

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RUNGLESS LADDER

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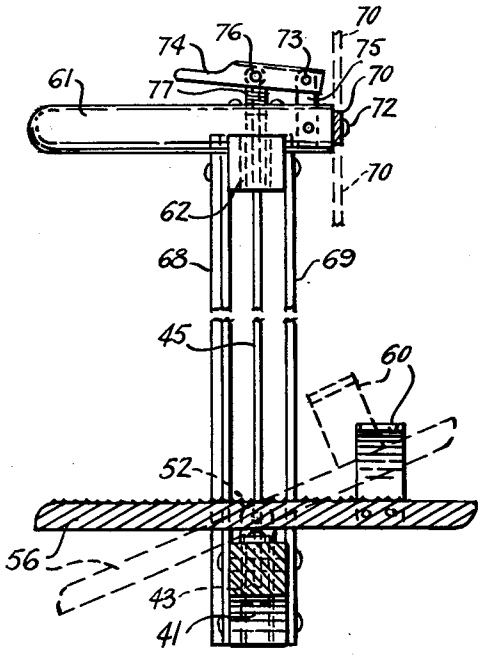


FIG. 5

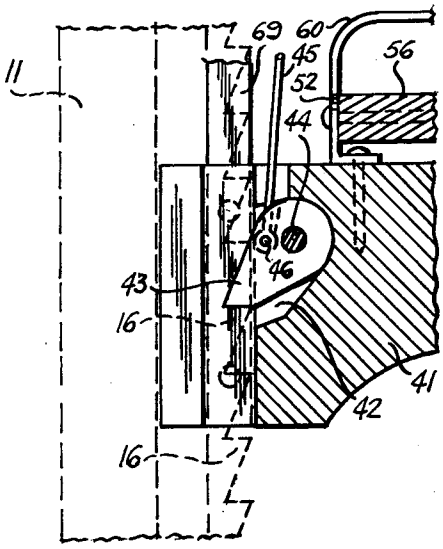


FIG. 6

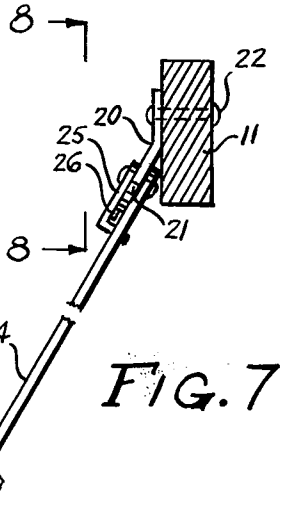


FIG. 7

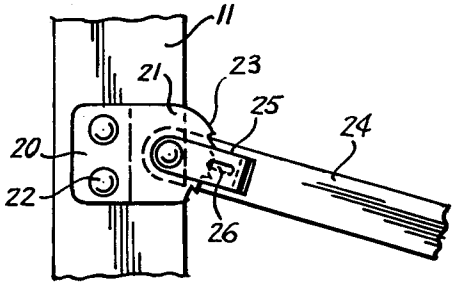


FIG. 8

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3,075,611

RUNGLESS LADDER

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Filed Feb. 14, 1962, Ser. No. 173,154
2 Claims. (Cl. 182—134)

This invention relates to a rungless ladder and has as its primary object the provision of an improved ladder provided with alternately movable steps which may be selectively moved by the climber either upwardly or downwardly to ascend or descend the ladder.

A particular object of the invention is the provision of a ladder which may be used in painting or working against a wall to permit ready access to the wall without the impediment of ladder rungs in front of the worker.

An additional object of the invention is the provision of a ladder whereby the entire height of a building wall may be painted or otherwise treated without the use of scaffolding.

A further specific object of the invention is the provision of steps which afford material comfort in standing in contrast to the ordinary round rung of a ladder.

Still another object of the invention is the provision of such a ladder having movable steps wherein the steps can be moved upwardly or downwardly a relatively short or great distance in accordance with the wishes of the operator to provide either long or short steps.

A further object of the invention is the provision of a safety connection between the opposite steps which will preclude too great a difference in their relative height on the ladder which might occasion slippage or falling of the user.

Still another object of the invention is the provision of steps or foot plates which are tiltable so as to be retained in substantially horizontal position regardless of the angle of inclination of the ladder relative to the surface against which it is placed.

An additional object of the invention is the provision of ratcheted transverse extensions for the base of the ladder to afford additional support and preclude slippage thereof.

Still another object of the invention is the provision of means whereby an extension or extensions may be readily secured to the upper end of a ladder as desired.

Still another object of the invention is the provision of a ladder of this character which is sturdy and durable in construction, reliable and efficient in operation, and relatively simple and inexpensive to manufacture and utilize.

Still other objects reside in the combinations of elements, arrangements of parts, and features of construction, all as will be more fully pointed out hereinafter, and disclosed in the accompanying drawings wherein:

FIGURE 1 is a front elevational view of one form of ladder constructed in accordance with the instant invention, parts thereof being broken away.

FIGURE 2 is an enlarged sectional view taken substantially along the line 2—2 of FIG. 1 as viewed in the direction indicated by the arrows.

FIGURE 3 is an enlarged sectional view taken substantially along the line 3—3 of FIG. 1 as viewed in the direction indicated by the arrows.

FIGURE 4 is an enlarged sectional view taken substantially along the line 4—4 of FIG. 1 as viewed in the direction indicated by the arrows.

FIGURE 5 is an enlarged sectional view taken substantially along the line 5—5 of FIG. 1 as viewed in the direction indicated by the arrows.

FIGURE 6 is an enlarged view taken substantially along the line 6—6 of FIG. 4 as viewed in the direction indicated by the arrows.

FIGURE 7 is an enlarged sectional view taken substantially along the line 7—7 of FIG. 1 as viewed in the direction indicated by the arrows; and

FIGURE 8 is an enlarged fragmentary side elevational view taken substantially along the line 8—8 of FIG. 7 as viewed in the direction indicated by the arrows.

Similar reference characters refer to similar parts throughout the several views of the drawing.

Having reference now to the drawings, in detail, the ladder of the instant invention is generally indicated at **10** and comprises a pair of substantially identical but opposite uprights **11**, which are connected at top and bottom by cross members **12** and **13**, respectively. It is to be understood that additional cross members may be employed, if desired, due to the length of the uprights. Each upright **11** includes on its inner side, that is, the side confronting its opposite upright, a plurality of ratchet teeth **14**, the teeth **14**, as best shown in FIG. 2, having indentations **15** on opposite sides thereof for a purpose to be more fully described hereinafter. A guide flange **16** extends inwardly from a portion **17** of the upright structure, to form a channel **18**, for a purpose to be more fully described hereinafter.

Teeth **14** and flanges **16** are cut off at a point adjacent the base of each upright, and terminate in a block portion **19** which serves as a stop for a purpose to be more fully described hereinater. The base of each member **11** is provided, as best shown in FIGS. 7 and 8, with a plate **20** having an offset portion **21** extending outwardly therefrom, the plate being secured to the upright **11** by means of a rivet or bolt **22**. Offset portion **21** is provided with an outer arcuate surface **23** having a plurality of ratchet teeth thereon. An elongated supporting member **24** is provided with an offset plate **25** having an indentation **26** thereon which engages the ratchet teeth **23**, the arrangement being such that the elongated portions **24** extending laterally from the base of the ladder serve as additional supports to the base of the ladder and prevent the same from slipping. By virtue of the ratchet arrangement **23** the elongated supports **24** may be accommodated to differing heights or varieties of terrain. A projecting foot **27** is provided at the end of each member **24**, and serves to dig into loose soil, or, alternately, to adhere to and prevent slippage on a hard surface such as concrete or the like.

At the upper end of the uprights teeth **14** are also stopped at stop blocks **30**, above which extend portions **11***a* of the uprights at the upper extremities of which are provided outwardly and rearwardly projecting members **31** which may be adjusted in any desired manner to space the upper end of the ladder from a building wall or other surface against which it is placed. The portions **11***a* may be secured directly to the top of the uprights **11** by means of plates **32** and bolts **33**, although in the illustrative embodiment shown, they are positioned at the end of an extension which is generally indicated at **34**, and which is attached as by means of plates **35** and bolts **36** to the top of the ladder section. The bolts **36** are provided with wing nuts **37** on their inner sides to facilitate the addition or removal of extension sections as may be desired. Additional cross members **12***a* extend across the top and bottom of the extended portions of the uprights and are secured thereto in any desired manner for properly spacing the same.

Each upright carries a step assembly generally indicated at **40**, the step assemblies being substantially identical but oppositely positioned. Each step assembly includes a supporting piece **41** having a recess **42** therein within which is pivoted a ratchet dog **43** on a pivot pin **44**. When the step assemblies are moved upwardly, the dog, as shown in FIG. 6, ratchets over each ratchet tooth **16** to hold its associated step assembly in a desired location. A pivoted rod **45** which is pivoted in a recess in dog **43** as at **46** may

be employed to move the dog into the recess 42 to permit the step assembly to move downwardly, in a manner to be more fully described hereinafter. As best shown in FIG. 4, ratchet dog 43 is positioned between two extending flange members 47 and 48, each of which has an inwardly turned portion 49 and 50, respectively, the arrangement being such that the portions 49 and 50 engage in the channels 15 behind each ratchet tooth 14, securely holding the step assembly against slippage. An extending portion 51 on flange 48 projects into the channel or groove 18 formed by the flange 16 as an additional safety measure.

Spaced apart lugs 52 and 53 extend upwardly from each support member 41 and have pivotally secured thereto complementary lugs 54 and 55 carried by a step plate 56. A clamping bolt 57 provided with a wing nut 58 permits tilting of the step plate as shown in dotted lines in FIGURE 5 to a position parallel to the ground level regardless of the angle of inclination of the uprights.

Each foot plate 56 is provided with an inwardly turned stirrup portion 60 beneath which the toe of the operator may be engaged to lift the plate when desired, the arrangement being such that each plate is lifted alternately as the user ascends the ladder, the ratchet dog 43 serving to hold each step in its newly elevated or raised position so that the operator may climb continuously simply by raising one foot and its associated step plate above the other. Hand means are also provided for lifting each step, and take the form of handles 61 which are mounted on supporting block 62, as best shown in FIG. 3. Each block 62 is provided with a pair of flanges 63 and 64 which have inturned ends 65 and 66, respectively, the inturned ends engaging in the grooves 15 behind each ratchet tooth 14, while an extending portion 67 of flange 64 rides in the groove or channel 18. Inner and outer plates 68 and 69 extending on opposite sides of their associated uprights connect the blocks 62 with the supports 41, so that the hand grasp members 61 and the foot plates 56 on opposite sides may move as a unit. A safety chain 70 connects the inner ends of opposite foot support members 40 to limit the extension therebetween, the chain also serving as a safety measure so that in the event of any malfunction one step will prevent the other from slipping entirely to the bottom of the ladder. An additional safety measure is provided in a transverse bar 71 which is pivotally connected at the ends of each handle 61, and which is provided with a slot 71 adjacent one end thereof to permit angular movement of the bar 70, as best shown in FIG. 1, as each step is advanced or retracted. Pins 72 removably secure the bar 70 to each handle so that the same can be removed, if desired.

Each operating or lifting handle 61 has pivotally mounted on a pivot 73 a thumb compressed member 74, the pivot 73 extending from a lug 75 carried by the handle. Pivotally connected at 76 to thumb lever 74 is the upper end of rod 45, a compression spring 77, as best shown in FIG. 5, serving normally to bias the rod upwardly to hold dog 43 in lug engaging position. However, compression of thumb lever 74 will force dog 43 rearwardly into recess 42 in such manner that the associated step assembly may be moved downwardly either by gravity or by foot pressure when it is desired to descend the ladder.

From the foregoing it will now be seen that there is herein provided a rungless ladder having oppositely disposed steps which may be alternately moved upwardly or downwardly by the operator to climb the ladder or descend thereon, which accomplishes all the objects of this invention, and others, including many advantages of great practical utility and commercial importance.

As many embodiments may be made of this inventive concept, and as many modifications may be made in the embodiment hereinbefore shown and described, it is to be understood that all matter herein is to be interpreted merely as illustrative, and not in a limiting sense.

I claim:

1. In a ladder construction, the combination of a pair of connected parallel uprights, ratchet teeth on the confronting sides of said uprights, a step assembly on each upright, each step assembly comprising a step support, a ratchet dog in each support engageable with the ratchet teeth of its associated upright, flange means securing each step assembly to its adjacent upright for linear movement therealong, a step plate on each step support, means for lifting each step plate, means for releasing each dog from engagement with its associated teeth, said last-mentioned means including a handle structure located above said step assembly, a spring biased lever on said handle structure, an operating rod connecting said dog with said lever, said handle structure including a flanged support block securing the same to its associated upright for linear movement therealong, means connecting each handle structure with its associated step assembly for simultaneous movement therewith, pivot means connecting each foot plate to its associated support for locating said step in horizontal position regardless of the angle of inclination of said uprights, means locking said step plate in a selected position of angular adjustment, and a safety chain connecting the opposite step assemblies,

a transverse bar pivotally connected at one of its ends to each handle structure, said plate having an elongated slot at one pivoted end to permit alternate elevation of said step assemblies.

2. In a ladder construction, the combination of a pair of connected parallel uprights, ratchet teeth on the confronting sides of said uprights, a step assembly on each upright, each step assembly comprising a step support, a ratchet dog in each support engageable with the ratchet teeth of its associated upright, flange means securing each step assembly to its adjacent upright for linear movement therealong, a step plate on each step support, means for lifting each step plate, means for releasing each dog from engagement with its associated teeth, said last-mentioned means including a handle structure located above said step assembly, a spring biased lever on said handle structure, an operating rod connecting said dog with said lever, said handle structure including a flanged support block securing the same to its associated upright for linear movement therealong, means connecting each handle structure with its associated step assembly for simultaneous movement therewith, pivot means connecting each foot plate to its associated support for locating said step in horizontal position regardless of the angle of inclination of said uprights, means locking said step plate in a selected position of angular adjustment, a safety chain connecting the opposite step assemblies, a transverse bar pivotally connected at one of its ends to each handle structure, said plate having an elongated slot at one pivoted end to permit alternate elevation of said assemblies,

a supplemental support member pivotally secured to the base of each upright, and ratchet means holding said supplemental support in a selected position of adjustment.

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