United States Patent [19]

Del Prete et al.

[11] **3,773,143**

[45] **Nov. 20, 1973**

[54] **ROLLER ATTACHMENT FOR LADDERS**

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[73] Assignee: **said Del Prete, by said Siegal**

[22] Filed: **Dec. 9, 1971**

[21] Appl. No.: **206,321**

[52] **U.S. Cl.** **182/214**

[51] **Int. Cl.** **E06c 7/48**

[58] **Field of Search** ..... 182/214, 107, 108; 248/354, 355, 161; 285/342, 339; 287/58 CT

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Primary Examiner—Reinaldo P. Machado
Attorney—Carlton Hill et al.

[57] **ABSTRACT**

A roller attachment for ladders comprises a telescopically adjustable bar carrying roller wheels at its opposite ends and having adjustably mounted clamps receptive of upper ends of the stiles of a ladder, enabling the upper end of the ladder to be easily moved vertically along a building face, especially with the roller bar straddling a building opening such as a window. Among features of novelty are the clamps, telescoping control for the bar sections, and the wheel mounting.

15 Claims, 4 Drawing Figures

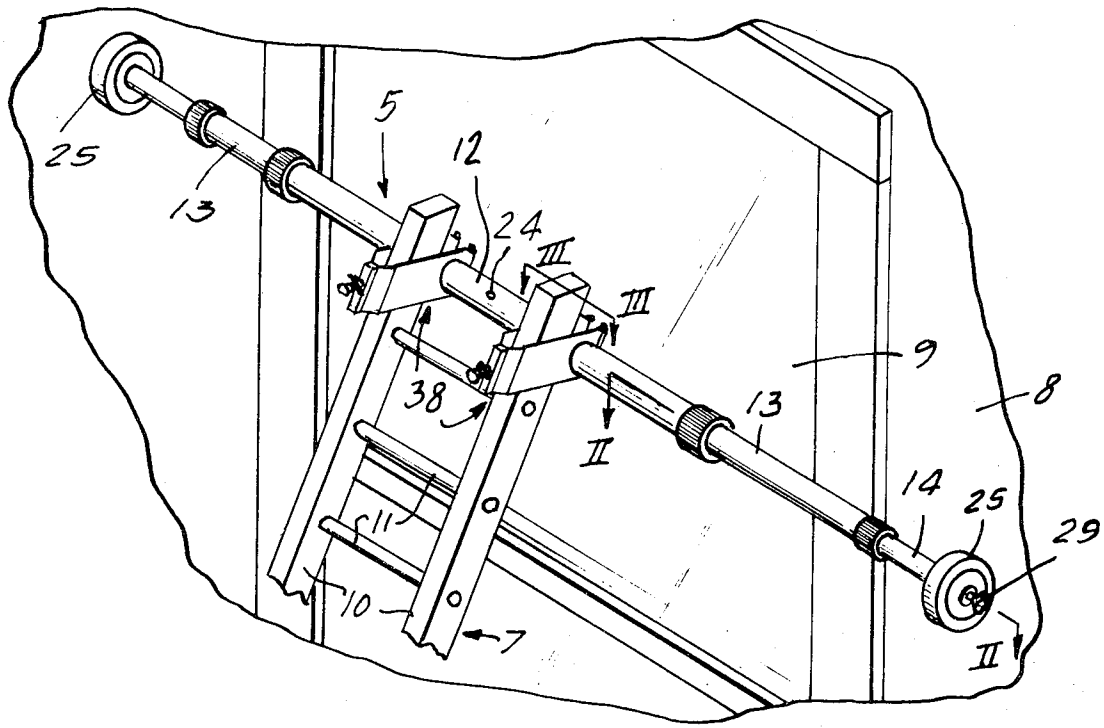


Fig-1

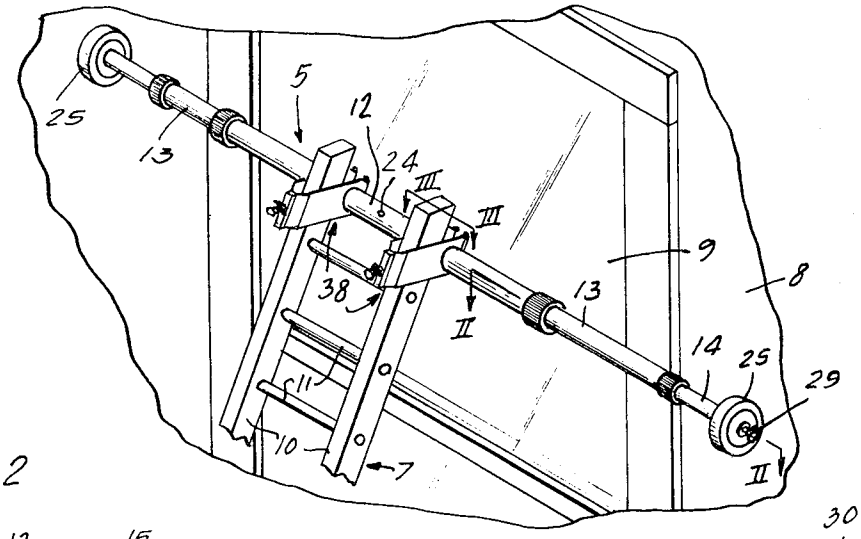


Fig-2

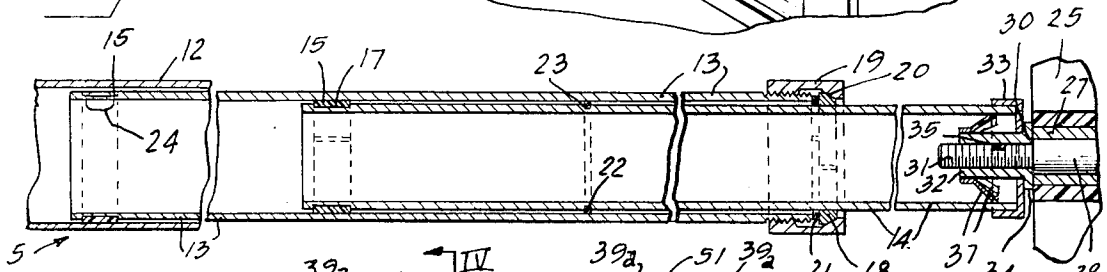


Fig-3

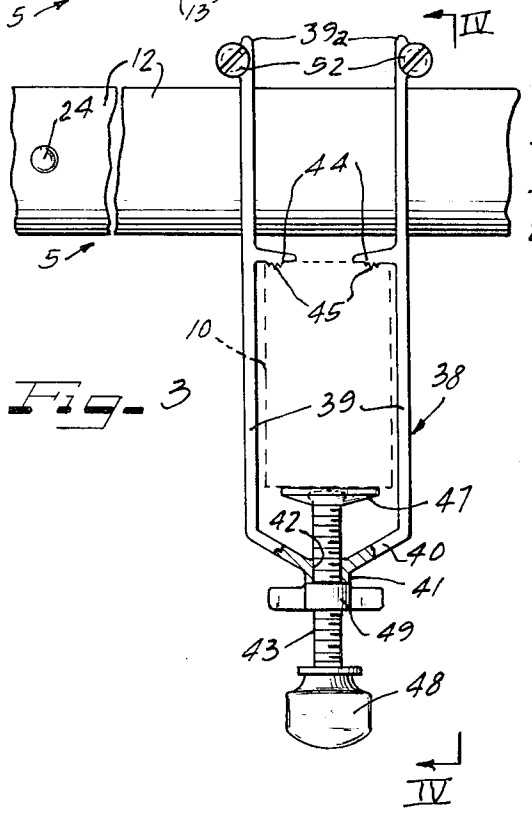
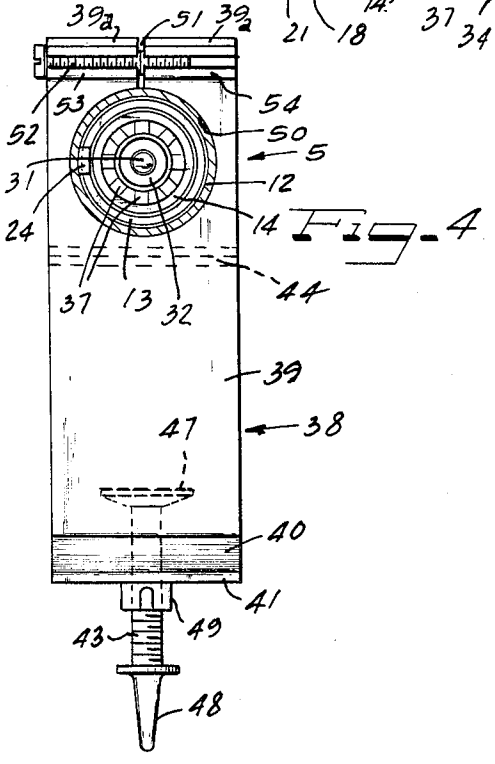


Fig-4



ROLLER ATTACHMENT FOR LADDERS

This invention relates to ladder attachments, and is more particularly concerned with a new and improved roller attachment for the upper end of a ladder such as an extension ladder.

Various devices have been proposed for attachment to the upper ends of leaning ladders to stabilize, enable rolling and to straddle window or other openings in the faces of buildings. However, such devices have been subject to several important deficiencies among which may be mentioned selectivity as to ladder size, where adjustable of relatively complex structure often involving separable parts that are liable to be lost, inadequate safeguards against loosening of parts, various complexities of structure which repel potential users, unsightlyness, overly heavy, lacking in sturdiness, and the like.

An important object of the present invention is to overcome the foregoing and other disadvantages, defects, inefficiencies, shortcomings and problems in prior devices of the class indicated and to attain important advantages and improvements in a roller attachment for ladders as will become apparent herein.

Another object of the invention is to provide a new and improved roller attachment for ladders which is simple in construction, easy to attach to a ladder, provides a firm and positive support for the upper end of a ladder, is light in weight relative to its sturdy construction, and is highly efficient in use.

Still another object of the invention is to provide a new and improved roller attachment for ladders having a novel attachment bracket structure.

A further object of the invention is to provide a new and improved roller attachment for ladders having novel telescopically adjustable bar means.

A still further object of the invention is to provide novel roller wheel mounting for ladder attachments.

A yet further object of the invention is to provide a new and improved roller attachment for ladders in which the principal components are adapted to be constructed from lightweight metal such as aluminum and magnesium.

Other objects, features and advantages of the invention will be readily apparent from the following description of a preferred embodiment thereof, taken in conjunction with the accompanying drawing, although variations and modifications may be effected without departing from the spirit and scope of the novel concepts embodied in the disclosure, and in which:

FIG. 1 is an isometric view representing a preferred embodiment of the invention in use;

FIG. 2 is a fragmental longitudinal sectional view taken substantially along the line II—II of FIG. 1;

FIG. 3 is a top plan view of one of the ladder stile-engaging clamps taken substantially on the plane of line III—III of FIG. 1; and

FIG. 4 is a sectional and side elevational view taken substantially along the line IV—IV of FIG. 3.

On reference to FIG. 1, a roller attachment 5 embodying features of the invention is mounted on the head end of a ladder 7 leaning toward a building face 8 having therein a window opening 9. As usual, the ladder 7 has spaced longitudinal sidepieces or stiles 10 and spaced rungs 11.

In a preferred construction, the attachment 5 comprises an assembly of relatively simple, sturdy, efficiently cooperating components and includes a transverse supporting bar telescopically adjustable as to length, means for attaching the bar to the ladder stile heads and antifriction roller wheel means. Accordingly, the bar comprises a sturdy but lightweight central section 12 of suitable length for minimal lateral projection for the intended purpose and within the opposite ends of which are telescopically mounted respective tubular extensions 13 which may, in turn, have respective tubular extensions 14 telescopically received in their outer ends, although, where desired, the extensions 14 may be omitted. All of the extensions 12, 13 and 14 are desirably constructed from rigid seamless tubular material which is substantially non-flexing, such as cylindrical aluminum and magnesium extruded tubing. In a typical practical form, the central section 12 may comprise tubing of 3¾ inches outside diameter, the intermediate sections 13 may comprise tubing of 1½ inches outside diameter and the end sections 14 may comprise 1¼ inches outside diameter tubing.

Inasmuch as the lightweight materials from which the tubing is preferably made have a tendency to gall and stick where they are in direct sliding contact, the tubing sections which are telescopically received are desirably in a differential diameter relation to the inside diameters of the receptors, and means are provided for maintaining a uniformly spaced relation between the facing surfaces of the telescoped tubing sections. For this purpose, the inner end portion of each of the telescopically received sections 13 and 14 is provided with a respective annular split ring, non-metallic antifriction bearing 15 seated in an annular groove 17 in the perimeter of the respective tube section and of a depth sufficiently less than the thickness of the bearing ring to support the ring with its outer perimeter in fairly close but free sliding engagement with the inner perimeter of the receptor tube.

Cooperative with each of the bearings 15 are bearing means carried by the outer end portion of each of the respective receptor tubular sections, desirably comprising an annular, antifriction, non-metallic split ring type bearing 18 mounted at the outer end of the receptor tube within a cam nut 19 of ring-shape to clear the telescoped tube freely therethrough in narrowly spaced relation and provided with a generally inwardly facing annular oblique cam surface 20 by which the bearing ring 18 is adapted to be thrust toward a bearing washer 21 freely seating on the end of the receptor tube on which the nut 19 is threadedly engaged, so that by tightening the nut, the bearing 18 will be substantially lockingly cramped against the telescoped tube whereby to hold it in desired telescopically adjusted position relative to the receptor tube. At the same time the cammingly cramped bearing ring 18 centers the telescoped tube within the receptor tube and in cooperation with the inner bearing 15 maintains the tubes in spaced relation. For effecting adjustments, the nut 19 is backed off sufficiently to release the bearing 18 for free sliding of the telescoped tube therethrough, but without permitting such canting of the tubes as to permit sliding engagement and possibly galling during the relative telescoping movements incident to adjustment. Material for the bearings 15 and 18 desirably comprises a relatively self-lubricating plastic such as nylon.

In addition to its bearing seat function, the washer ring 21 serves a useful function as a limit stop against excessive withdrawal of the telescoped tube. To this end, the washer is of a slightly smaller inside diameter

than the outside diameter of the telescoped tube such that although the telescoped tube can move freely and without galling or other hindrance through the washer, the inner perimeter of the washer 21 will in effect overhand the space between the telescoped tubes. Thereby the washer 21 serves as a stop opposing a stop 22 conveniently in the form of a snap ring seated in an annular groove 23 in the perimeter of the telescoped tube spaced a substantial but limited distance from the inner bearing 15 such that when the stop 22 engages the stop ring 21, there will remain an adequate length of the telescoped tube within the receptor tube for efficient stability against any tendency toward sagging of the extended tubes due to weight applied to the bar transversely thereto as from the leaning ladder 7 and a person standing thereon. In order to avoid any strain on the clutch nuts 19 by intemperate telescopic thrusting of the tube into its receptor tube, stop means are preferably provided within the receptor tubes to engage with the inner end of the telescoped tube at its preferred telescoped limit, short of engagement of the outer end of the receptor tube with the nut 19 of the telescoped tube. In a desirable form, the internal stops comprise respective lugs 24, one such lug being mounted midway between the ends of the tube 12 to project inwardly into the path of the inner end of the telescoped tubes 13, as shown in FIGS. 1, 3 and 4. Another such stop lug 24 is desirably mounted on the intermediate tube 13, conveniently at the split end clearance for the inner bearing 15 carried by the intermediate tube 13 as shown in FIG. 2. These lugs 24 may be of the type commonly referred to as pop rivets.

At each opposite end of the bar assembly is mounted a roller wheel 25 preferably rubber-tired and detachably secured in a manner to enable ready assembly with or removal from the bar to facilitate knockdown shipping and storage of the device. Each of the wheels desirably has a central fixed antifriction bushing bearing 27 through which is engageable an axle 28 provided by the body of a bolt provided on its outer end with a wing head 29 providing an outer end retaining shoulder on the axle opposing the outer end of the bearing 27 and enabling ready manual digital manipulation of the axle bolt. On its inner end portion, the axle bolt body 28 has an inwardly facing annular stop shoulder 30 about a threaded shank extension 31 of the bolt which is threadedly engageable in an axle socket provided by a ferrule 32 which extends axially inwardly through an end cap 33 and has on its outer end a lateral seating and spacer flange 34 engaging the outer face of the cap and providing a spacer opposing the inner end of the bearing 27. Unintentional displacement of the threaded shank 31 from the ferrule 32 is prevented by means such as a friction thread lock 35 such as a nylon pellet carried by the shank 31 intermediate its length. Permanent retention of the ferrule 32 within the associated tube section 14 is by means such as a set of resilient outwardly biased and generally outwardly extending biting fingers 37 projecting from the inner end portion of the ferrule toward and into biting, locking engagement with the inner wall surface of the tube 14. Through this arrangement, simple and easy assembly of the cap 33 and the ferrule 32 assembled therewith and with the fingers 37 permanently attached to the ferrule is facilitated, comprising applying the cap 33 to the outer end of the tube 14 and then driving the ferrule inwardly with the fingers bitingly contacting the inner wall surface of the tube and the flange 34 holding the cap 33 firmly on its tube end seat to provide with the fingers 37 a firm axle support for the associated wheel 25.

Simple and efficient means are provided for attaching the roller bar to the ladder stiles 10, comprising a pair of preferably identical clamps 38. In a practical construction, each of the clamps 38 comprises as the main component a one-piece generally U-shaped body which is adapted to be formed as an extruded aluminum or magnesium section having coextensive elongated complementary arms 39 spaced apart to receive between their inner opposed faces a ladder stile of maximum width to be found among generally available ladders of any of the numerous makes, whether of wood or metal. At one of their coextensive ends the clamp arms 39 are integrally joined by a web 40 which desirably arches outwardly and has a reinforcing rib 41 along its crest providing an increased section thickness for a central tapped clamping screw hole 42 through which a clamping screw 43 is threaded for clampingly thrusting the stile 10 on which the clamp is engaged against shoulder means on the inner sides of the arms 39, desirably in the form of respective coextensive transversely aligned, rigid shoulder flanges 44 integral with the arms, extending throughout the width of the arms and desirably having antislip means in the form of friction teeth 45 on their stile-engaging surfaces. On its inner end, the screw 43 desirably has a swivel pressure pad 47 for clampingly engaging the ladder stile. On its outer end the screw 43 is desirably provided with a manually digitally manipulatable wing head 48. To lock the screw 43 against unintentional release of the clamped ladder stile, a locking wingnut 49 is desirably carried by the screw and adapted to be lockingly turned against the rib 41 after the screw 43 has been clampingly thrust against the engaged stile 10.

For adjusted mounting of the clamps 38 on and along the central bar section 12, each of the arms 39 is, at least in the free end portion thereof rearwardly from the respective shoulder 44 of a width substantially greater than the diameter of the tubular bar section 12 as well as of substantially greater length so that the bar section 12 will be encompassed by a substantial area of each of the arms as engaged about the bar section which extends through aligned complementary mounting holes 50 in the arms 39 and which holes are normally slightly oversize relative to the outer perimeter of the tube 12 to enable free and easy mounting of the clamps on and adjusted longitudinally along the bar section 12.

Means are provided for locking the arms 39 on the bar section 12, conveniently comprising having the free end portions of the arms 39 slotted longitudinally inwardly, as shown at 51, into the mounting holes 50 and thereby dividing the respective free end portions of the clamp arms 39 into respective pairs of integral jaws 39*a*. Means for drawing the jaws 39*a* together into thorough gripping engagement with the tube section 12 comprise respective drive screws 52 which extend freely through an integral screw socket sleeve 53 on the jaw 39*a* which is accessible from the top of the clamp and which is aligned with a similarly formed integral screw socket 54 on the lower of the pair of jaws and into which the screw 52 is threadedly driven to draw the jaws into tight engagement with the bar section 12. After both of the screws 52 have been driven to draw

up both sets of jaws onto the section **12**, extremely firm clamping engagement with the bar section **12** is assured. On the other hand, adjustment of either or both of the bracket clamps **38** longitudinally along the bar section **12** can be easily effected by simply loosening the screws **52** to release the clamp jaws.

In use of the device **5**, after it has been fully assembled, with the clamps **38** on the central bar section **12**, and at least the telescopic bar sections **13** assembled with the central section **12**, and where desired the end telescopic sections **14** assembled with the sections **13**, and the wheels **25** assembled with the opposite ends of the assembled bar, the clamps **38** are properly adjusted relative to one another on the bar section **12** to receive the head end portions of the ladder stiles **10** in proper fitting relation, the clamps being then fixed to the central section and clampingly fixed to the stile heads. With the supporting bar properly extended to straddle the desired opening in the building face, the ladder is erected and with the aid of the rollers **25** run up to the desired height on the building face. Thereby, the laterally stretched arms of the device provide great lateral stability for the ladder and provide a convenient handhold for the user. Not only do the wheels **25** facilitate running up of the ladder, but since they are rubber-tired they thoroughly protect the wall surfaces along which they run, and the head end of the ladder is maintained clear of the wall face. The tire tread grips the engaged surface, i.e. the wall and contributes to stability of the top of the ladder.

Should there be a use situation where the wheels **25** may be inconvenient or even a liability such as where plural windows are separated by narrow vertical mullions, the wheels may be omitted or removed from the assembly, so that the supporting bar can bridge and rest directly against the mullions, to take advantage of the space-spanning length of the bar.

After use, storage and transportation of the ladder are adapted to be effected in the normal manner by simply removing the device **5** by unclamping the clamps **38** from the stiles and lifting the device free from the ladder. The device can then be stored in limited space along with or separate from the ladder. If the device must be stored in a manner which would be inconvenient with the wheels **25** assembled therewith, the wheels can be easily removed by detaching the axle bolts. If even more compact storage is necessary than will permit the clamps **38** remaining on the bar, the clamps can be fairly easily removed with simply the aid of a screw driver and manual manipulation of other elements of the combination.

It will be understood that variations and modifications may be effected without departing from the spirit and scope of the novel concepts of this invention.

We claim as our invention:

1. A roller attachment device for ladders of the leaning type including rungs and spaced longitudinal stiles having free head end portions, comprising:

a transverse supporting bar having a central tubular section and telescopically adjustable bar sections mounted in and extending from the opposite ends thereof;

separate spaced attachment clamps each having a rear end portion adjustably mounted on said central section and each clamp having a front end portion extending forwardly from said rear end portion and retainingly engageable on and about one of said stiles and having means for fixedly clamping the same to the engaged stiles;

means for securing said rear end portions releasably but securely to said central section;

means for attaching respective roller wheels on the opposite ends of the bar and wherein each wheel has axle means for coaxial mounting on the outer end of one of the telescopically adjustable bar sections; and

means releasably securing said rear end portions of the clamps to said central section and permitting adjustable shifting of the clamps longitudinally along said center section and relative to one another and providing for fixed attachment of the clamps in any selected adjusted position to accommodate any particular spacing of the ladder stiles with which engaged.

2. A device according to claim **1**, including an additional outer end telescopic bar section telescopically engaged in each of said first mentioned adjustable bar sections for carrying said roller wheels.

3. A device according to claim **2**, including stop means within each of said adjustable bar sections to limit inward telescopic movement thereinto of said outer end telescopic bar sections.

4. A device according to claim **1**, wherein said telescopically adjustable bar sections have tubular outer end portions, caps mounted on the ends of said outer end portions, and said attaching means being carried by said caps for releasably supporting said axle means.

5. A roller attachment device for ladders of the leaning type including rungs and spaced longitudinal stiles having free head end portions, comprising:

a transverse supporting bar having a central tubular section and telescopically adjustable bar sections mounted in and extending from the opposite ends thereof;

respective spaced attachment clamps adjustably mounted on said central section and each extending forwardly therefrom and retainingly engageable with one of said stiles and having means for fixedly clamping the same;

means for attaching respective roller wheels on the opposite ends of the bar and wherein each wheel has axle means for coaxial mounting on the outer end of one of the telescopically adjustable bar sections;

each of said clamps comprising a generally U-shaped one-piece body having a pair of spaced elongated arms to receive one of the ladder stiles therebetween and with a connecting web between forward ends of the arms;

means carried by the web and said arms of each clamp for clampingly securing the stiles in the clamp; and

means on rear end portions of the arms for securing the respective clamp to said central section.

6. A device according to claim **5**, wherein said means carried by the web comprises a thumbscrew threaded through said web and having a pressure pad on its inner end for engaging the stile.

7. A device according to claim **6**, wherein said means carried by the arms comprise respective shoulder flanges extending toward one another spaced from said web and toward which said clamping screw thrusts the ladder stile.

8. A device according to claim 5, wherein said rear end portions of the arms have aligned holes therethrough through which the central section extends.

9. A device according to claim 8, wherein said rear end portions have slots extending into said holes and dividing such rear end portions into gripping jaws, and means for drawing said gripping jaws into tight engagement with the central section.

10. A roller attachment device for ladders of the leaning type including rungs and spaced longitudinal stiles having free head end portions, comprising:

a transverse supporting bar having a central tubular section and telescopically adjustable bar sections mounted in and extending from the opposite ends thereof;

respective spaced attachment clamps adjustably mounted on said central section and each extending forwardly therefrom and retainingly engageable with one of said stiles and having means for fixedly clamping the same;

means for attaching respective roller wheels on the opposite ends of the bar and wherein each wheel has axle means for coaxial mounting on the outer end of one of the telescopically adjustable bar sections;

said axle means comprising a bolt having a cylindrical body journalling the respective wheel and a threaded extension on the bolt;

said means releasably supporting the axle means comprising an internally threaded ferrule extending coaxially through the cap and having an outer end lateral cap-retaining and spacer flange; and

self-retaining gripper fingers carried by the inner end portion of the ferrule and retainingly engaging the associated tubular outer end portion of the associated bar section.

11. A roller attachment device for ladders of the leaning type including rungs and spaced longitudinal stiles having free head end portions, comprising:

a transverse supporting bar having a central tubular section and telescopically adjustable bar sections mounted in and extending from the opposite ends thereof;

attachments clamp means mounted on said central section engageable with said free end portions of the stiles and having means for fixedly clamping the same;

said telescopically adjustable sections being in differential diameter to the inside diameter of said central section to provide limited space between the telescopically related sections;

slidable spacer bearing means carried by the inner end portions of the telescopically adjustable sections in engagement with the inner wall surface of the central section;

split ring spacer bearing means carried on the outer ends of said central section and engaging the outer perimeters of the respective telescopically adjustable sections to maintain a definite spaced relation between the bar sections;

cam thrust means mounted on said ends of the central section and operable to drive said central section carried split ring spacer bearing menas clutchingly against the respective adjustable bar sections to maintain them in telescopically adjusted relation to the central section;

a thrust washer mounted between said split ring bearing means and each of the respective ends of the central section and providing respective annular shoulders partially across a gap between the sections; and

a shoulder on each of the telescopically adjustable sections spaced a substantial but limited distance from the bearing means carried by said inner end portions, and said shoulders engageable with said thrust washers to limit protraction of the respective adjustable bar sections.

12. A device according to claim 11, wherein in order to minimize the gap space between the adjustable sections and said central section, respective annular grooves are provided in said adjustable sections and said slidable bearing means and said shoulder on each of said adjustable sections comprising annular members seated in said grooves and projecting therefrom into the gaps between the adjustable sections and said central section.

13. A device according to claim 11, wherein said adjustable sections have structure on their outer ends projecting to a larger diameter than the outside diameter of the adjustable sections, and stop means carried interiorly by said central section and engageable by the inner ends of said adjustable sections to limit inward telescopic movement of the adjustable sections to prevent said projecting structure from striking against the respective outer ends of said central section when telescoping the adjustable sections to their inward telescopic limit.

14. A roller attachment device for ladders of the leaning type including rungs and spaced longitudinal stiles having free head end portions, comprising:

a transverse supporting bar having a central tubular section and telescopically adjustable bar sections mounted in and extending from the opposite ends thereof;

attachment clamp means mounted on said central section engageable with said free end portions of the stiles and having means for fixedly clamping the same;

said telescopically adjustable bar sections having tubular outer end portions;

caps mounted on the ends of said outer end portions;

respective roller wheels having axles with threaded free end portions;

respective ferrules carried by said caps within which said threaded end portions are threadedly engageable for connecting the wheels to said caps; and

means securing said caps with the ferrules assembled therewith in place on said tubular outer end portions.

15. A device according to claim 14, including self-retaining gripper fingers carried by said ferrule and retainingly engaging within the associated tubular outer end portion of the associated bar section.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,773,143 Dated November 20, 1973

Inventor(s) Cosimo Del Prete et al

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, line 16, for "3 3/4" read --1 3/4--.

Column 3, line 5, for "hand" read --hang--.

Column 8, line 1, for "menas" read --means--.

Signed and sealed this 16th day of April 1974.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

FORM PO-1050 (10-69)

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* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334