March 16, 1965 L. F. STURDY ETAL 3,173,512

LADDER LEVELLING DEVICE

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FIG.2.

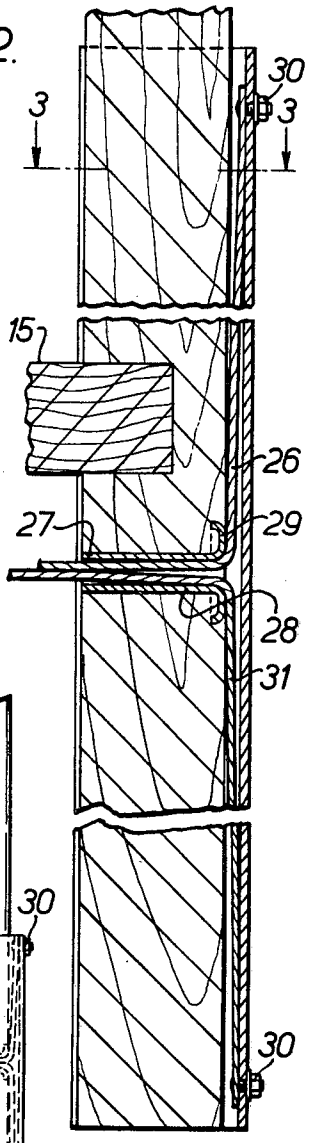
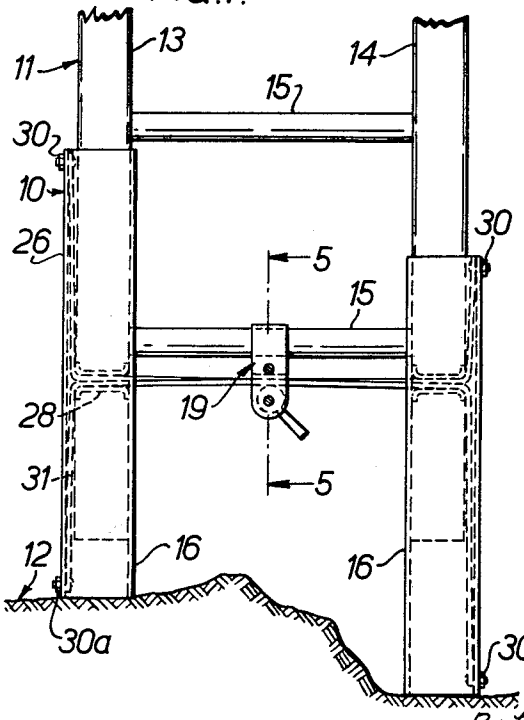


FIG.1.



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FIG.3.

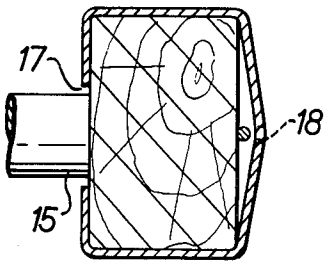


FIG.4.

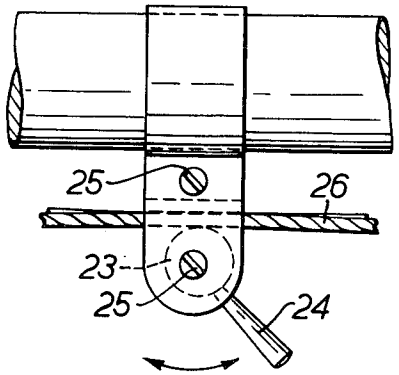
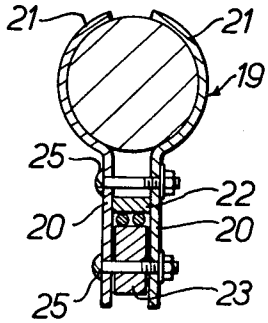


FIG.5.



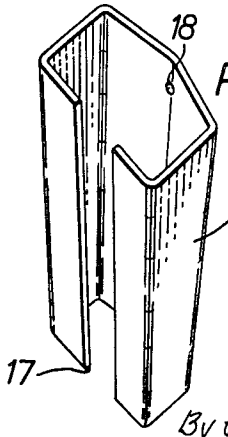


FIG.6.

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LADDER LEVELLING DEVICE

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4 Claims. (Cl. 182—202)

This invention relates to ladders and more particularly to a means for adjusting the legs of a ladder to compensate for the slope or unevenness of the surface on which the ladder may rest.

A number of devices of this type have been proposed but these have not been entirely satisfactory due to being expensive to manufacture, awkward to use or not completely reliable in operation. It will be appreciated that devices of this type particularly those intended for use on long extension ladders should be completely reliable in operation to insure the safety of persons working thereon.

It is an object of the present invention to provide a ladder levelling means which is inexpensive to manufacture and simple and reliable in operation.

It is a further object of the invention to provide ladder levelling means which is readily adaptable for use on most conventional ladders including extension ladders and step ladders so that it is not essential to modify the conventional ladder to any great extent or to produce a ladder particularly for use with this device.

The present invention provides a ladder levelling device comprising a pair of extension legs adapted to slidably engage opposite side rails of a ladder, clamping means including a cam member and securable to the ladder, a first flexible member interconnecting the upper portions of said extension legs, a second flexible member interconnecting the lower portions of said extension legs, said first and second flexible members passing through said clamping means, and said cam member in said clamping means being adapted releasably to engage said flexible members and prevent movement of said flexible members relative to one another and to said clamping means.

In the drawings which illustrates an embodiment of this invention:

FIG. 1 is a front elevational view of the levelling means of this invention installed on a ladder shown supported on uneven terrain;

FIG. 2 is a sectional front elevational view of part of the ladder and levelling means of FIG. 1;

FIG. 3 is a cross sectional view taken substantially along the line 3—3 of FIG. 2;

FIG. 4 is an enlarged front elevation of the clamping means of FIG. 1;

FIG. 5 is a cross sectional view taken along the line 5—5 of FIG. 1; and

FIG. 6 is a perspective view of the extension legs of the levelling means of FIG. 1.

Referring now in detail to the drawing in which the levelling device shown generally at **10** in FIG. 1 is shown installed on the lower portion of a ladder shown generally at **11** supported by uneven ground **12**.

The ladder **11** is of conventional construction and comprises side rails **13** and **14** which are connected by rungs **15**.

The levelling device **10** comprises a pair of extension legs **16** adapted to slide longitudinally on the side rails **13** and **14** of the ladder **11**. Each of the extension legs **16** are formed in the shape of a tube having a substantially rectangular cross section and a longitudinally extending slot **17**, see FIGS. 3 and 6. The width of the

slot **17** is slightly greater than the diameter of the rungs **15**. The side of each extension leg **16** opposite the slot **17** is provided with a longitudinally extending outwardly bent portion defining a channel **18** the purpose of which will be explained below.

A clamping mechanism **19**, shown in FIGS. 4 and 5, is secured to a lower rung **15** of the ladder **11** and comprises a pair of plates **20** each plate having a curved rung engaging portion **21** at one end thereof. A spacer element **22** is provided between the plates **20** adjacent the rung engaging portions **21**, being secured as by welding to one of the plates **20**. An eccentric cam member **23** and its associated operating lever **24** is rotatably secured between the plates **20** by a bolt **25** passing through the cam **23** and the plates **20**, the arrangement being such that there is a gap between the edge of the cam **23** and the spacer element **22**. The cam has such dimensions and is so mounted with respect to the spaced element **22** that movement of the operating lever **24** to the right as indicated in FIG. 4 tends to almost close the gap between the edge of the cam and the spacer element **22**; movement of the operating lever **24** in the reverse direction tends to increase the width of this gap. A second bolt **25** passing through suitable apertures in the plates **20** urges the rung engaging portions **21** of the plates **20** into gripping engagement with the rung **15**.

A flexible member such as a length of cable **26** is secured by bolts **30** to the upper end of the extension leg **16** on the side rail **13**. The cable **26** passes downwardly between the side rail **13** and the inside of the extension leg **16** in the channel **18** described above and shown most clearly in FIG. 3. A pair of mutually opposed apertures **27** bored in the side rails **13** and **14** of the ladder below the lower rung **15** are provided with bushings **28** shown most clearly in FIG. 2. Inward movement of the bushing **28** is prevented by integral flange **29** thereon.

The cable **26** passes through the bushing **28** in the side rail **13**, then through the clamping mechanism **19** between the spacer element **22** and the cam member **23**, then through the bushing **28** in the side rail **14**, and then upwardly through the channel **18** in the extension leg **16** on the side rail **14**. A bolt **30** secures the end of the cable **26** to the upper end of the extension leg **16** on the side rail **14**.

Similarly, a second flexible member such as a cable **31** is connected by a bolt **30***a* to the lower end of the extension leg **16** on the side rail **13**. The cable **31** passes between the side rail **13** and the extension leg **16** in channel **18**, then through the bushing **28** in the side rail **13**, then through the clamping mechanism **19**, then through the bushing **28** in the side rail **14**, and then through the channel **18** in the extension leg **16** on the side rail **14**. The end of the cable **31** is secured by the bolt **30***a* to the lower end of the extension leg **16** on the side rail **14**. Between the bushings **28** the cables **26** and **31** lie parallel and closely adjacent to one another. The cables **26** and **31** are of such length that little if any slack is left in the cables when they are installed as described above.

As will be apparent from the drawings, when the ladder **11** provided with the device **10** is set up on sloping ground **12**, the clamping mechanism **19** being in the inoperative position, the extension legs **16** move longitudinally on the side rails of the ladder to support the ladder in the desired position as illustrated in FIG. 1. As the extension legs **16** move to the desired position there is corresponding movement of the two cables **26** and **31**. The bushings **28** prevent the cables from causing undue wear at the points where the cables pass through the side rails **13** and **14** of the ladder.

Downward movement of extension leg **16** on side rail **14** causes cable **26** to move to the left as viewed in FIG. 1 and upward movement of the extension leg **16** asso-

ciated with side rail **13** causes the portion of cable **26** so displaced to be taken up. The relative movement of cable **31** is the reverse of that described above in connection with cable **26**.

The extension legs **16** are locked in the desired position by moving the operating lever **24** of the clamping mechanism **23** so that the eccentric cam member **23** is brought into firm contact with the cables **26** and **31** thereby pressing them into frictional engagement with the spacer element **22**. The ladder **11** remains supported in the desired position by the extension legs **16** until the user moves the ladder to a new location where a different arrangement of the extension legs **16** is required. It is then necessary to release the clamping mechanism to allow the extension legs to adjust to the terrain in that location and then to bring the clamping mechanism into operation again.

It is understood that the specific embodiment described above is simply illustrative of the principles of the invention and that the various modifications which will occur to those skilled in the art will fall within the spirit and scope of the invention.

For example it is possible to modify the arrangement of the cables **26** and **31** shown in FIG. 1 so that the cables would be on the exterior of the extension legs **16**. The cables would then pass through suitable brackets secured to the ladder rather than passing thourgh apertures **27** in the side rails of the ladder as described above.

We claim:

1. A ladder levelling device comprising a pair of extension legs adapted slidably to engage opposite side rails of a ladder, manually operable clamping means directly and fixedly securable to said ladder, said clamping means including a pair of plates, a portion of each said plate being shaped so that said plates co-operate to embrace a ladder rung therebetween, a cam member pivotally secured between said plates, a first flexible member interconnecting the upper portions of said extension legs, a second flexible member interconnecting the lower portions of said extension legs, said first and second flexible members passing through said clamping means, and said cam member in said clamping means being adapted to engage said flexible members and prevent movement of said flexible members relative to one another and to said clamping means unless said clamping means is manually released.

2. A ladder levelling device comprising a pair of extension legs adapted slidably to engage opposite side rails of a ladder, manually operable clamping means securable to said ladder, said clamping means including a pair of plates, a portion of each said plate being shaped so that said plates co-operate to embrace a ladder rung therebetween, means to urge said portions of said plates together to fixedly secure said clamping means to said rung, a circular disc including handle means, said disc being eccentrically mounted between said plates, a first flexible member interconnecting the upper portions of said extension legs, a second flexible member interconnecting the lower portions of said extension legs, said first and second flexible members passing through said clamping means, and said circular disc in said clamping means being adapted to engage said flexible members and prevent movement of said flexible members relative to one another and to said clamping means unless said clamping means is manually released.

3. A ladder comprising a pair of opposed side rails, rungs between said side rails, a pair of extending legs adapted slidably to engage said side rails, manually operable clamping means fixedly secured to said ladder, said clamping means including a pair of plates, a portion of each said plate being shaped so that said plates co-operate to embrace one of said rungs therebetween, a cam member pivotally secured between said plates, a first flexible member interconnecting the upper portions of said extension legs, said first flexible member passing through one of said side rails, said clamping means and the other of said side rails; a second flexible member interconnecting the lower portion of said extension legs, said second flexible member passing through one of said side rails, said clamping means and the other of said side rails, and a cam member in said clamping means, said cam member being adapted to engage said flexible members and prevent movement of said flexible members relative to one another and to said clamping means unless said clamping means is manually released.

4. A ladder comprising a pair of opposed side rails, rungs between said side rails, a pair of extension legs adapted slidably to engage said side rails, manually operable clamping means fixedly secured to a selected one of said rungs, said clamping means including a pair of plates a portion of each said plate being shaped so that said plates co-operate to engage said rung therebetween, means to urge said portions of said plates together, a circular disc including handle means, said disc being eccentrically mounted between said plates, a first flexible member interconnecting the upper portions of said extension legs, said first flexible member passing through one of said side rails, said clamping means and the other of said side rails; a second flexible member interconnecting the lower portions of said extension legs, and second flexible member passing through one of said side rails, said clamping means and the other of said side rails, said disc in said clamping means, being adapted to engage said flexible members and prevent movement of said flexible members relative to one another and to said clamping means until said clamping means is manually released.

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