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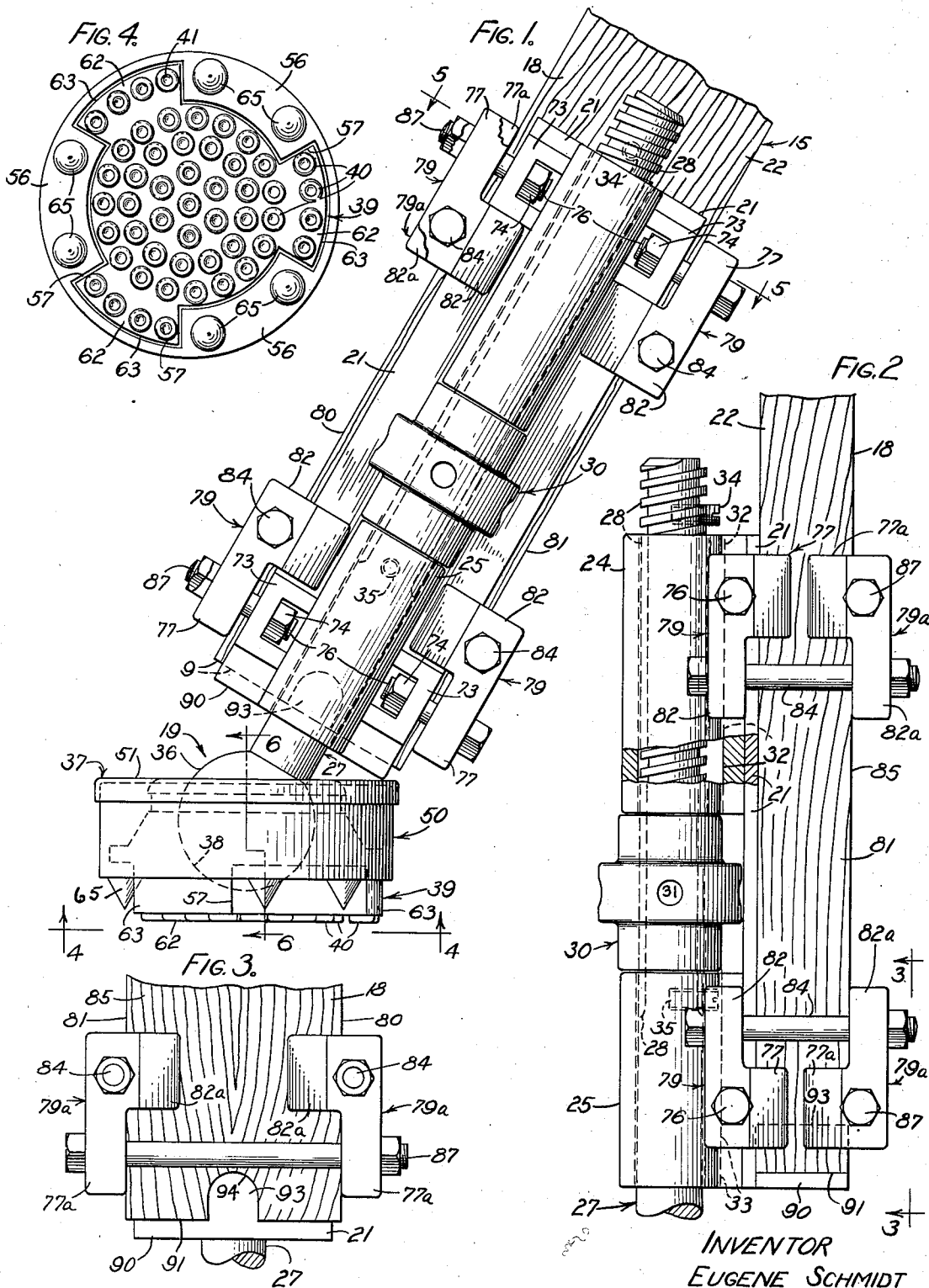
E. SCHMIDT

2,318,017

ANTISLIP FOOT

Filed April 29, 1940

2 Sheets-Sheet 1



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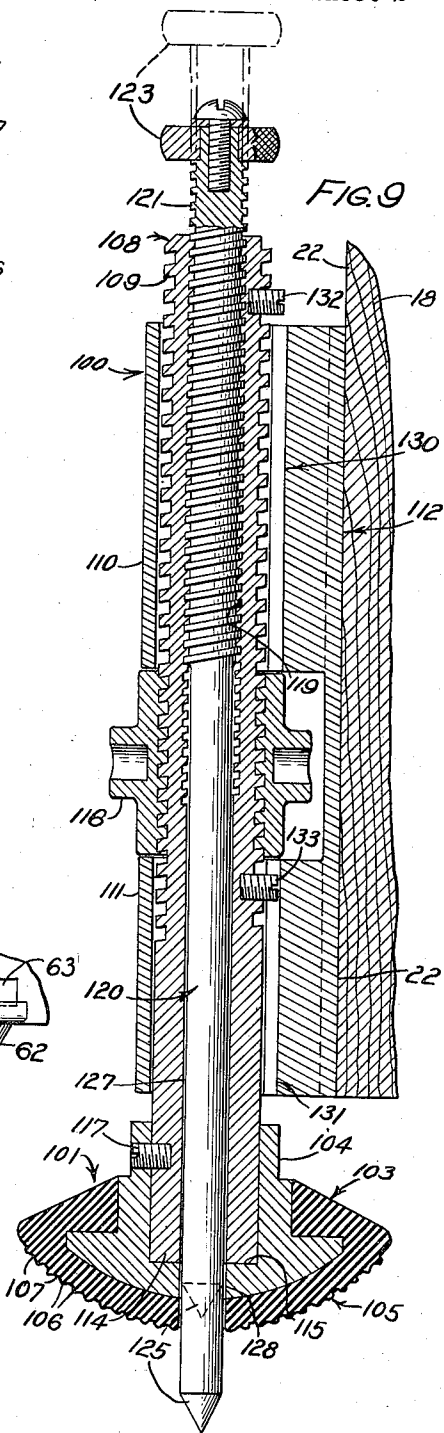
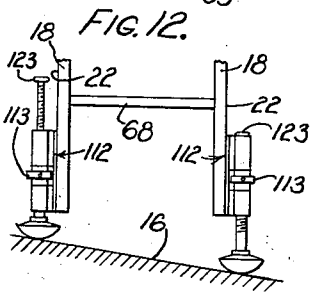
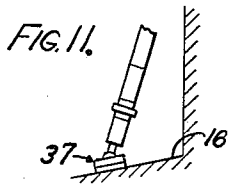
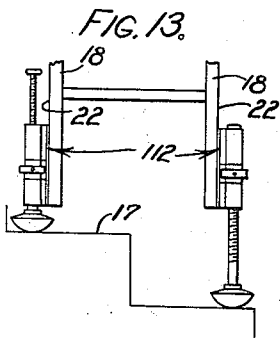
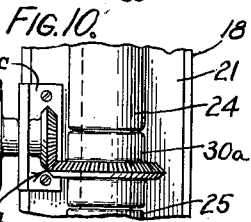
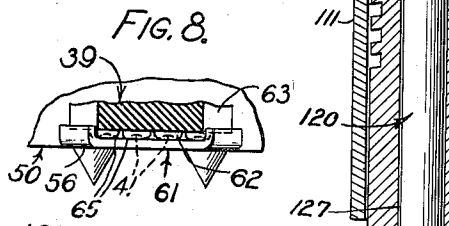
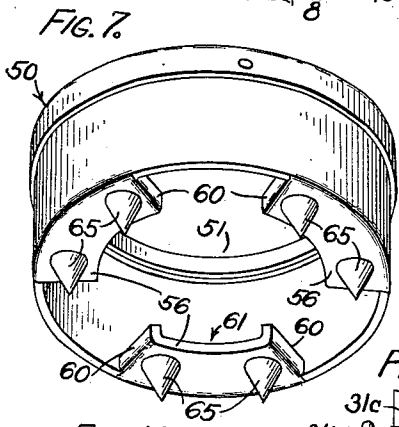
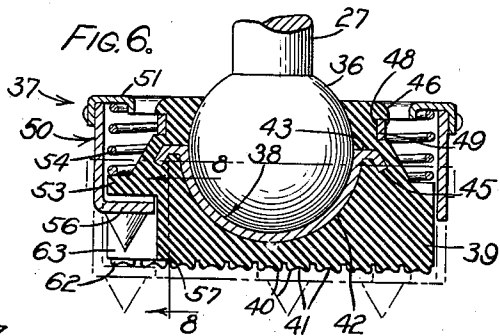
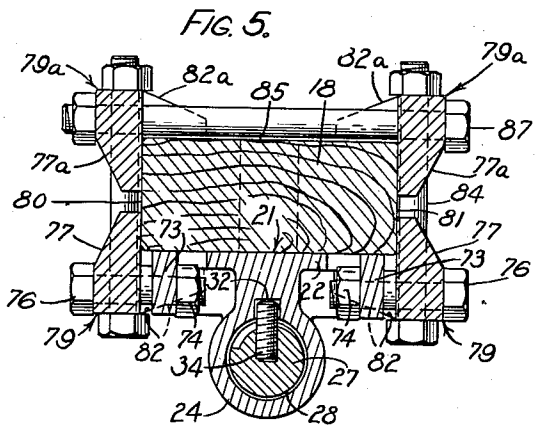
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2 Sheets-Sheet 2



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2,318,017

ANTISLIP FOOT

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10 Claims. (Cl. 228—63)

This invention relates to anti-slip means for leg-supported and other devices, and more particularly to ladders, tripods and the like which in service may rest on non-planar or inclined surfaces.

It is an object of my invention to provide an anti-slip device adapted to be secured to a leg of a ladder or the like and provide a sure and adequate grip on a support irrespective of the inclination of the ladder to the vertical.

It is another object to provide a foot having relatively yielding and rigid gripping means selectively usable irrespective of the relation of the leg to the supporting surface and on different kinds of such surfaces.

A further object resides in the provision of a reinforced rubber foot.

Another object is to provide a foot structure which is readily adjustable to insure proper division of the load on the various feet, irrespective of the supporting terrain.

It is a further object to provide an improved means by which an anti-slip device may be securely mounted on a ladder leg or the like.

Additional objects and advantages of the invention will appear as the description proceeds.

My invention will be better understood upon reference to the following description and accompanying drawings, in which:

Fig. 1 is a fragmentary side elevation of a ladder equipped with an anti-slip foot device in accordance with one form of my invention, the ladder being shown at an exaggerated inclination.

Fig. 2 is a fragmentary side elevation of the upper part of the same.

Fig. 3 is a fragmentary rear elevation taken as indicated by the line 3—3 in Fig. 2.

Fig. 4 is a bottom plan view taken as indicated by the line 4—4 in Fig. 1.

Fig. 5 is a sectional plan view taken as indicated by the line 5—5 in Fig. 1.

Fig. 6 is a fragmentary section elevation taken as indicated by the line 6—6 in Fig. 1.

Fig. 7 is an isometric view of the shell forming a part of the structure shown in Fig. 6.

Fig. 8 is a fragmentary sectional view taken as indicated by the line 8—8 in Fig. 6 but with the shell in the position shown in dotted lines in Fig. 6.

Fig. 9 is a fragmentary longitudinal sectional view of a modified form of the invention.

Fig. 10 is a fragmentary elevation showing a modified adjusting means.

Figs. 11, 12 and 13 are fragmentary elevations

showing how the invention is useful on different kinds of supporting surfaces.

Referring now more particularly to the drawings, there is shown at 15 by way of example a ladder which is adapted to be securely supported on a surface 16 which may incline transversely (Fig. 11) and/or parallel (Fig. 12) to the supporting wall or on any other surface or surfaces 17 (Fig. 13) for the purpose of illustrating the adaptability of my invention to difficult conditions. The forms to be described may be used interchangeably on the various types of supporting surfaces. Mounted on each rail 18 of the ladder is an anti-slip device 19 constructed in accordance with one form of my invention.

The device 19 comprises a preferably metallic bracket 21 adapted to lie against the outer face 22 of the associated rail 18 and provided with spaced upper and lower sleeves 24 and 25 which receive a preferably metallic rod 27 threaded at 28 throughout a substantial portion of the length thereof. According to one form of my invention, an adjusting nut 30 between the sleeves 24 and 25 and threaded about the rod 27 and knurled or provided with wrench holes 31 is rotatable by hand or a tool to adjust the rod up and down. If desired, the nut as shown at 30a in Fig. 10 may have a miter gear connection 31a with a handle or knob 31b, supported as by a bracket 31c carried by the bracket 21, whereby rotation of the knob will control the adjustment of the rod 27. The rod is preferably slidably keyed or other suitable provision is preferably made to prevent rotation of the rod. For example, the sleeves 24 and 25 may be provided with grooves or keyways 32 and 33, respectively, and pins or screws 34 and 35, respectively, may be secured to the rod 27 so that the heads of the pins are slidable in the respective grooves. The arrangement is such that at no time are both pins disengaged from the grooves, thus insuring prevention of turning of the rod at all times. Moreover, the nut provides an abutment engageable by the pin 34 to limit the downward movement of the rod 27, and also engageable by the pin 35 to limit the upward movement of the rod 27.

The rod 27 terminates at its lower end in a ball 36 providing universal support for a foot 37, having a spherical socket 38 embracing more than a hemispherical portion of said ball so as to be connected thereto. The foot 37 may comprise a resilient rubber gripping element or tread 39 having gripping beads 40 disposed preferably in generally the same plane and adapted to afford a better grip than a relatively smooth sur-

face, said beads being suction cupped as at 41 if desired. A metal reinforcing liner 42 is molded integral with the tread 39 and provides a substantial part of the ball-bearing area of the socket 38. The liner preferably has an outwardly extending flange 43 with a preferably downwardly extending lip 45, whereby to distribute the load from the ball to substantially the entire substance of the tread member 39. The rubber material converges upwardly from the liner to provide a resilient retaining lip 46 embracing the ball, said lip being expansible by the ball to admit the ball to the socket and having a circumferential outer groove 48 in which is received a preferably metallic endless ring 49 which may tightly embrace the lip. This ring is preferably shoved into place after the ball has expanded the lip 46 and slipped fully into the socket. The ring thereafter prevents the lip 46 from expanding sufficiently to permit separation of the tread 39 from the ball. The lip serves also as a limit to the relative inclination of the foot and rod.

Telescopically fitted about the tread 39 is a shell or sleeve 50 having an inwardly overhanging integrally connected flange 51. Between this flange and a shoulder 53 on the tread 39 is a spring 54, which may be under compression. This spring is operative to urge the sleeve upward relative to the tread 39. The sleeve is provided with inwardly projecting lugs or tongues 56 accommodated in complementary recesses 57 in the lower part of the tread when the latter is in service.

Each tongue 56 has end flanges 60 providing sockets 61 in which the bottom portions 62 of the lugs 63 alternating with the recesses 57 are adapted to seat, when the sleeve is depressed sufficiently to enable the tongues to clear the lugs and then turned substantially through the angle subtended by a lug 63, bayonet fashion. The tongues 56 carry preferably steel or other metallic spikes 65 which project substantially below the element 39 when the lugs 63 of the latter are seated in the sockets 61. By reversing the bayonet action, the sleeve may be made to occupy its inoperative position. Thus when the ladder is supported on an icy or earthy or other surface adapted to be better gripped by the spikes than by the rubber element, the sleeve 50 is adjusted to project the spikes below the rubber (Fig. 6 in dotted lines, and Fig. 8), and when surfaces on which the latter affords a better grip are encountered, the sleeve is shifted to inoperative position (Fig. 6 in full lines).

Inasmuch as the foot 37 is universally mounted, its entire gripping portion, whether yieldable or rigid, is certain to engage the supporting surface, the load being transmitted to each foot from the associated ladder rail 18, bracket 21, nut 30 and rod 27. The load is incident on the liner 42, which, as explained, distributes the load so thoroughly in the rubber element 37 that substantially all of the beads 40 or spikes 65, as the case may be, exert substantial gripping pressure, thereby firmly anchoring the ladder to its support. By the adjusting means referred to, the foot 37 may be adjusted to any height desired to insure that each foot takes its share of the load and to enable the ladder rungs 68 to be horizontal and the upper ends of the rails to engage the wall against which the ladder is leaning.

The securement of the bracket 21 on rails of different sizes forms a feature of my invention. To this end I provide, preferably adjacent each end of the bracket, lugs 73 preferably non-rotat-

ably receiving nuts 74 on bolts 76 extending through said lugs, said bolts also extending through and clamping ears 77 of clamp members 79 against the front and rear faces 80 and 81, respectively, of the rail. Each member 79 has another clamping ear 82 at a right angle to the ear 77 and engaging the bracket 21. A like pair of clamping members 79a having corresponding ears 77a and 82a is similarly disposed with respect to the other corner portions of the rail. A bolt 84 clamps each pair of clamp ears 82 and 82a against the bracket 21 and opposite face 85 of the rail, and another bolt 87 clamps the ears 77a against the front and rear faces 80 and 81 of the rail. It is evident from the drawings and the foregoing description that the clamp members and bracket are so dimensioned that they may be securely clamped to rails of different cross-sectional sizes and at any desired positions along the rails. The clamping faces may be knurled or otherwise roughened to securely grip the rails.

A plurality of clamp mechanisms may be employed, as shown with one adjacent each end of the bracket 21, or otherwise. The bottom of the bracket 21 is preferably provided with a flange 90 to abut the bottom 91 of the rail 18, and with a reinforcing boss or lug 93 projecting into a complementary recess or opening 94 in the bottom of the rail.

In accordance with another form of anti-slip device 100 (Fig. 9) embodying my invention, I employ, instead of the universal foot mounting heretofore described, a foot 101 comprising a rubber or other suitable resilient tread element 103 reinforced by a steel or other metal sleeve or cup 104 integrally molded thereto. Thus the sleeve 104 may form one of the molding members for the element 103. The ground-engaging surface 105 of the tread element is preferably spherical or otherwise convex and preferably comprises beads 106 which may be vacuum cupped as at 107.

Instead of the rod 27, I employ in this form a sleeve 108 threaded externally as at 109 and extending through the sleeves 110 and 111 of a bracket 112 similar to the bracket 21 and receiving a nut 116 whereby the sleeve 108 may be adjusted up and down. The sleeve 108 has its bottom 114 projecting below the bracket 112 and resting on a shoulder 115 in the tread-reinforcing cup 104, the sleeve being secured in the cup by any suitable means, such as a set screw 117.

The sleeve 108 is internally threaded as at 119 and a rod 120 threaded as at 121 engages the interior thread of the sleeve. The rod 120 projects above the sleeve 108 and has a knob or handle 123 for rotation thereof. The bottom of the rod is in the form of a spike 125 which may project down through registering holes 127 and 128 in the cup 104 and tread element 103, respectively, or may be retracted upward to a point above the bottom of the tread as shown in dotted lines.

Since the thread friction on the rod 120 is likely to be less than the friction between the nut 116 and the bracket sleeves 110 and 111, and the thread friction between the nut 116 and the sleeve 108, when the anti-slip device is free of the ground, and certainly is less than the friction between the tread element 103 and the ground or the like if the anti-slip foot 101 is on the latter, rotation of the rod 120 will cause the same to rise or descend, as desired. In practice, if the anti-slip foot is free of the ground or the like,

the user will grasp the foot 101 while he rotates the rod 120 or the nut 116.

As in the form previously described, the bracket 112 preferably has keyways 130 and 131 accommodating keys or pins 132 and 133, respectively, on the sleeve 108.

With the latter construction it is evident that by virtue of the curvature of the surface 106 the tread element 103 will amply grip the ground or the like irrespective of the surface formation and irrespective of the inclination of the plane of the ladder.

Various modifications may suggest themselves to those skilled in the art without departing from the spirit of my invention, and, hence, I do not wish to be restricted to the specific form shown or uses mentioned, except to the extent indicated in the appended claims, which are to be interpreted as broadly as the state of the art will permit.

I claim:

1. An anti-slip device, comprising a resilient rubber foot having a socket of greater than hemispherical extent, a supporting member having a metal ball anchored in said socket, a hemispherical metal shell lining the base of said socket and in bearing engagement with said ball, said shell having a rim flange imbedded in said rubber whereby the load from said ball is distributed throughout a substantial part of the rubber, and a relatively rigid band surrounding said rubber beyond said shell for preventing removal of said ball from said socket.

2. An anti-slip device, comprising a resilient rubber foot having a socket of greater than hemispherical extent, a supporting member having a metal ball anchored in said socket, and a hemispherical metal shell lining the base of said socket and in bearing engagement with said ball, said shell having a rim flange imbedded in said rubber whereby the load from said ball is distributed throughout a substantial part of the rubber.

3. An anti-slip device, comprising a resilient rubber foot having a socket of greater than hemispherical extent, a supporting member having a metal ball anchored in said socket, and a relatively rigid band surrounding a chordal portion of said socket adjacent the mouth thereof to prevent separation of said foot from said ball.

4. An anti-slip device, comprising a bracket, means for mounting said bracket on a ladder rail, a pair of gripping members, one of said members being carried by said bracket, the other of said members being carried by said one member, and means for relatively adjusting said members to locate either of said members selectively in operative position.

5. An anti-slip device, comprising a pair of coaxially related gripping members, one of said members being relatively soft and the other being relatively rigid, one of said members being

supported on the other, means comprising a universal support for the supporting member, and means for relatively adjusting said members to render either of them selectively operative.

6. An anti-slip device, comprising a resilient rubber gripping member, a spiked relatively rigid gripping member, an element adapted for connection to a ladder rail, a ball-and-socket connection between one of said members and said element, and bayonet means connecting said members together, whereby either of said members may be selectively disposed lowermost.

7. An anti-slip device comprising a resilient rubber gripping member and a spiked relatively rigid gripping member, means connected to said device for transmitting load from a ladder to said device, and means connecting said members together for selective operation of said members, said rubber member transmitting load regardless whether it or the other member is in gripping position.

8. An anti-slip device, comprising a resilient rubber gripping member, a relatively rigid shell about said member, said member having recesses from the bottom upward at least part way, and intervening lugs, said shell having tongues slidably received in said recesses, said shell being shiftable to project its tongues below said recesses and laterally to locate its tongues below said lugs, means for preventing lateral displacement between said tongues and lugs, spikes projecting down from said tongues, said spikes projecting below said rubber member when said tongues are below said lugs, said spikes terminating above the bottom of said rubber member when said tongues are in said recesses, and means yieldably holding said tongues in the selected positions.

9. An anti-slip device, comprising a bracket adapted to be attached to a ladder rail, a resilient rubber gripping member having gripping means disposed substantially in a plane, a ball-and-socket connection between said rubber member and said bracket, means for vertically adjusting said connection, and a relatively rigid gripping member having gripping spike points disposed substantially in a plane and supported by said rubber member in selectively operative and inoperative positions.

10. An anti-slip device, comprising a resilient rubber gripping member, a relatively rigid gripping member having ground penetrating means, means operatively connecting said members together in coaxial relation and to a ladder rail, and means for relatively adjusting said members to dispose either of said members in operative and the other in inoperative position, selectively, said adjusting means being operative to project and maintain said penetrating means in penetrating positions at different distances beyond said resilient member.

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