Aug. 5, 1958 H. J. THOMISZER 2,845,719

INDICATING DEVICE FOR LADDERS AND THE LIKE

Filed April 21, 1955

Fig. 1

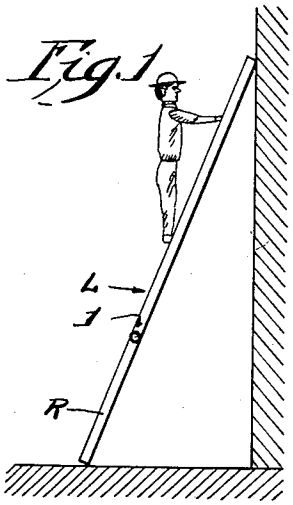


Fig. 2

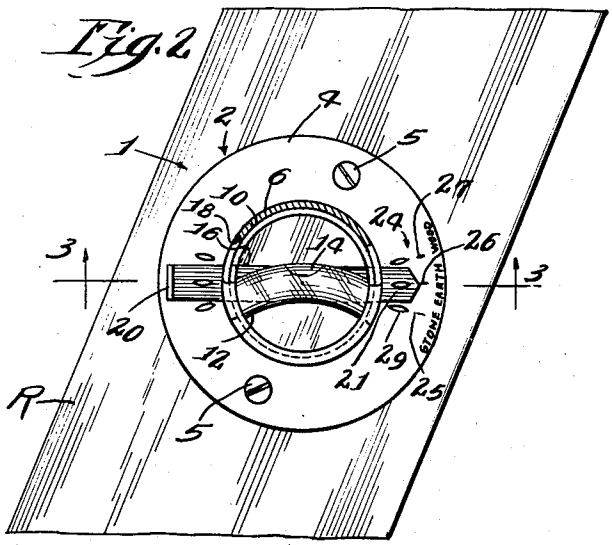


Fig. 3

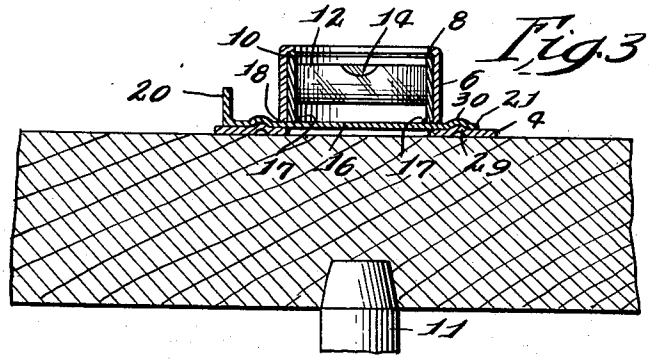


Fig. 4

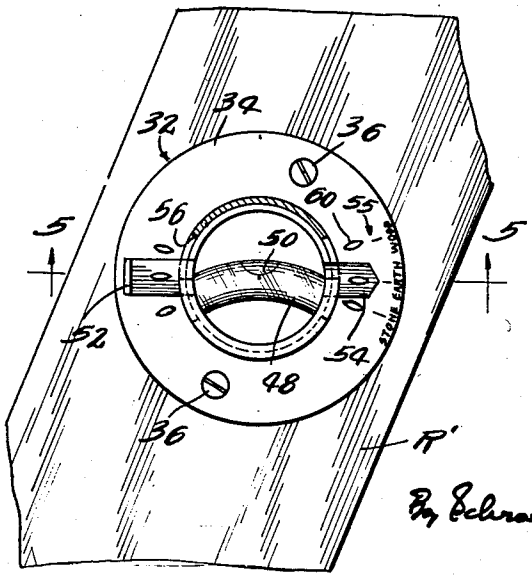
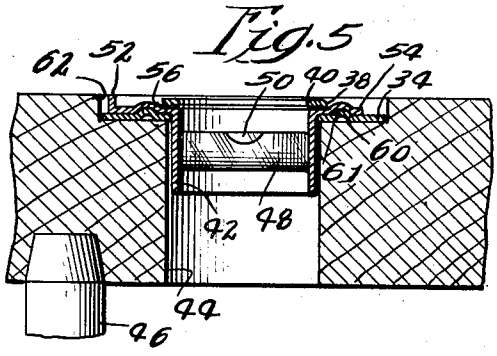


Fig. 5



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INDICATING DEVICE FOR LADDERS AND THE LIKE

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1 Claim. (Cl. 33—207)

This invention relates to an indicating device for ladders and the like, and has for a general object the provision of a device to facilitate setting of a ladder at a safe angle with a building or other structure without guessing and without the necessity of resorting to calculation.

In the use of ladders of the type illustrated, difficulty is encountered in placing the ladder at a safe angle with the building or structure against which it is leaned. If the ladder is placed at too steep an angle, it is likely to tip over backward, or the user is likely to assume an unstable position on the ladder. If the ladder is placed at too great an angle with the building, there is a likelihood that the bottom end of the ladder will slip away from the building.

In ascending or descending a ladder, one usually proceeds with the arms in a somewhat extended position and does not normally move the body further from the ladder than the extended length of the arms permits, as illustrated in Fig. 1. Since the average ratio of the extended distance of one's arms to his height from feet to shoulders may be considered as about one to two and one-half, if the ladder is placed at an angle of about 22° with the building, the center of gravity of a man standing with his arms extended will pass substantially through the rung on which he is standing. This may be considered a relatively stable position. If the ladder is placed at a steeper angle, the center of gravity of the man standing with his arms extended will pass behind the rung on which he is standing, and a force-distance moment tends to pull him away from the ladder. This may be considered an unstable position. If the ladder is placed at an angle greater than 22° with the building, the center of gravity will pass between the building and the rung on which the man is standing. This position is the most stable since a force-distance moment tends to hold one on the ladder.

As a general proposition then, the user is permitted to assume the most stable position on the ladder when the ladder is placed at the maximum safe angle it can make with the building without slipping at the bottom end. In all situations, this maximum safe angle depends on the coefficient of friction between the material of which the ladder rails are constructed and the surface on which the bottom end of the ladder rails rest. The friction between the top of the ladder rails and the building or structure against which the ladder is leaned is regarded as negligible since the ladder is often provided with rollers at the top to facilitate manipulation and since the surface of the building or structure is often smoothly finished, thus affording little opposition to slippage. In some situations, depending on the coefficient of friction between the ladder rails and the surface on which the bottom end of the rails are supported, the maximum safe angle may be less than 22°, in which case, the user will be required to exercise care that he does not assume

an unstable position on the ladder. But obviously, if the coefficient of friction permits, the safest angle for the ladder is one greater than 22° and less than the angle at which the bottom end will slip.

When all of the necessary factors are considered, it is a burdensome operation to determine by calculation on the spot the safest angle at which to place the ladder with a building or structure, and it can be a dangerous procedure to guess at the safest angle for the ladder.

It is an object of this invention to provide an indicating device for ladders or the like including an attachable mounting member and an air-bubble level device carried on the mounting member in a position so that the ladder will be placed at a safe angle with a building when the air bubble is centered.

Another object is to provide a stability indicator having a supporting member attached to a ladder rail and carrying a housing mounted for angular adjustment about an axis parallel to the ladder rungs, an air bubble tube extending crosswise of the housing, and a scale on the supporting member correlated to the frictional characteristics of various surfaces on which the bottom end of the ladder may be supported, for indicating the position to which the housing should be adjusted, depending on the particular surface on which the bottom end of the ladder rests, in order that the air bubble will be centered when the ladder is placed at a maximum safe angle with a building.

A further object is to provide a stability indicator including a supporting member having an annular flange adapted to be attached to a ladder rail and a tubular portion extending outwardly from the inner edge of the annular flange, a housing member mounted in the tubular portion of the supporting member for rotary adjustment, an air bubble tube extending across the housing member, a bar secured to and extending diametrically across the housing member and passing through opposed arcuate slots provided in the tubular portion of the supporting member, and cooperating means on the bar and flange for releasably holding the housing member in adjusted positions.

Other objects and advantages will become readily apparent from the following detailed description taken in connection with the accompanying drawings, in which:

Fig. 1 is an elevational view showing a ladder incorporating my invention leaned against a building or other structure;

Fig. 2 is an enlarged fragmentary elevational view of the ladder shown in Fig. 1, illustrating one embodiment of the invention and having a portion broken away to better illustrate details of construction;

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is an elevational view similar to Fig. 2, showing another embodiment of the invention; and,

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 4.

The invention further resides in the combination, construction and arrangement of parts illustrated in accompanying drawings, and while I have shown preferred embodiments therein, I wish it understood that they are susceptible of modification and change within the scope of the appended claim.

Referring now to Figs. 2 and 3, in one embodiment, the invention is incorporated in an indicator 1 adapted to be secured to one of the side rails R on a ladder L. The indicator includes a mounting member 2 having an annular flange 4 which may be fastened as by screws 5 to the side of the ladder rail R. The indicator may be conveniently positioned at about five feet from the bottom of the ladder rail. The holes provided in the flange 4 for the screws 5

should be placed on a line extending vertically of the ladder rail.

A tubular portion **6** extends outwardly from the inner edge of the flange **4** and is provided at its outer end with a narrow inwardly-turned flange **8** partially enclosing the tubular portion **6**. A hollow cylindrical housing member **10** is rotatably mounted within the tubular portion **6** for angular adjustment about an axis parallel to the ladder rungs, one of which is indicated at **11**. An air bubble level tube **12**, filled with liquid to an extent to leave an air bubble **14**, extends across the housing member and is cemented or otherwise secured thereto.

In order to provide for adjustment of the housing member **10**, a bar **16**, extending diametrically across the housing member, is secured thereto, as by welding indicated at **17**. Opposite end portions of the bar **16** pass through opposed arcuate slots **18** provided in the tubular portion **6** adjacent the flange **4**. The slots **18** limit movement of the housing member to its extreme positions. At one end, the bar **16** is provided with an outwardly-turned tab **20** which may be grasped to facilitate angular adjustment of the housing member within the tubular portion **6**.

The other end of the bar **16** constitutes a pointer **21** adapted to register with marks on a scale **24** provided on the flange **4**. The markings on the scale **24** are correlated to the various values for the coefficient of friction between the material of which the ladder is constructed, and various surfaces on which the bottom end of the ladder may be rested, and indicate the position to which the housing member **10** should be adjusted, depending on the particular surface on which the ladder is rested, in order that the air bubble **14** will be centered in the tube **11** when the ladder is placed at the maximum safe angle with a building or structure. Thus, assuming the ladder rails are of wood, the mark **26** might indicate the position to which the pointer **21** is to be adjusted when the ladder is rested on earth. If the maximum safe angle for a wood ladder on an earth surface is 22°, then the mark **26** is placed at an angle of 22° from a line extending transversely across the ladder rail through the center of the housing member **10**. Then when the pointer is set in this position, and the ladder is supported on earth, the bubble will be centered, as shown, when the ladder is placed at the maximum safe angle.

In a similar manner, the marks **25** and **27** might indicate the position to which the housing **10** should be adjusted in order that the air bubble will be centered when the ladder is placed at the maximum safe angle with a building or structure when it rests on stone and wood, respectively. It will be appreciated that the scale may be arranged to indicate other suitable angles to which the housing may be adjusted. For example, if the ladder on which the indicator is mounted were constructed of metal, the marks might be arranged to indicate the positions to which the pointer should be set for metal on wood, metal on stone, and so forth.

Raised beaded portions **29** are provided on the flange for cooperation with an indentation **30** in the bottom surface of the pointer to releasably hold the housing member in adjusted positions.

The device illustrated in Figs. 2 and 3 is especially adapted for application to existing ladders. In Figs. 4 and 5, I have illustrated an embodiment which may be incorporated in ladders in the process of their manufacture.

Referring to Figs. 4 and 5, a mounting member **32** is provided with an annular flange **34** adapted to be secured to a ladder rail R' by screws or bolts **36** in a position similar to that described in connection with modification of Figs. 2 and 3. A short cylindrical portion **38** extends outwardly from the inner edge of the annular flange **34** and is provided at its outward end with a narrow inwardly-turned annular flange **40**, partially enclosing the cylindrical portion **38**.

A tubular housing member **42** is rotatably supported within the mounting member and the ladder rail is provided with a recessed portion **44** adapted to receive the housing member **42**. The housing member is mounted for angular adjustment about an axis parallel to the ladder rungs, one of which is indicated at **46**. An air bubble level tube **48**, similar to the tube **12** in Figs. 2 and 3, extends across the housing member **42** and is cemented or otherwise secured thereto. As in Figs. 2 and 3, an air bubble **50** in the tube **48** is adapted to be centered in the tube in order to indicate when the ladder is placed at a safe angle with a building or structure. The recess **44** provided in the ladder rail R' may extend completely through the ladder rail to provide a clear through vision so that the bubble tube may be viewed from either side of the ladder rail in adjusting the position of the ladder, or the recess may extend only far enough into the rail to receive the housing member **42**. The mounting flange **34** may be secured to the side of the ladder rail or the recess **44** may be enlarged as at **62** to receive the flange **34** to provide a flush mounting as shown.

At diametrically-opposite positions, the housing member is provided with an integral tab **52** which may be grasped in order to facilitate adjustment of the housing within the mounting member, and a pointer **54** adapted to register with a scale **55** provided on the mounting flange. The adjusting tab **52** and the pointer **54** extend through diametrically-opposed arcuate slots **56** provided in the mounting member.

The scale **55** provided on the mounting flange **54** may be graduated in accordance with the principles set forth in describing the modification of Figs. 2 and 3. That is, the marks in the scale may be correlated to the various values for the coefficient of friction between the material of which the ladder rails are constructed and the various surfaces on which the bottom end of the ladder may be rested. Raised beads **60** are provided on the flange **34** for cooperation with an indented portion **61** on the underside of the pointer **21** in order to releasably hold the housing member in adjusted positions.

I claim:

A ladder having a pair of side rails and spaced rungs extending therebetween and a stability indicator attached thereto, comprising, an attaching member fastened to the side of one of said side rails at a distance from the lower end of the side rail to be generally at eye level when the ladder is extending upwardly, an air bubble tube, a carrying member for said tube supported on the attaching member, and a scale associated with said bubble tube having spaced indicia with a first legend identifying a surface having a particular coefficient of friction on which the ladder may rest positioned to indicate the inclination said tube should have to indicate by reference to said air bubble tube only when the ladder resting on said surface is at an angle safe from the standpoint of slipping while yet providing maximum moment tending to rotate the same in the direction of inclination due to the weight of a person on the ladder, and a second legend identifying a second surface on which the ladder may rest having a coefficient of friction different from said first surface positioned to indicate the inclination said air bubble tube should have to indicate by reference to said tube alone when the ladder resting on said second surface is at an angle safe from the standpoint of slipping while yet providing maximum moment tending to rotate the same in the direction of inclination due to the weight of a person on the ladder.

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