Jan. 10, 1967 N. WELLER 3,298,012

LADDER WARNING DEVICE

Filed Sept. 23, 1964

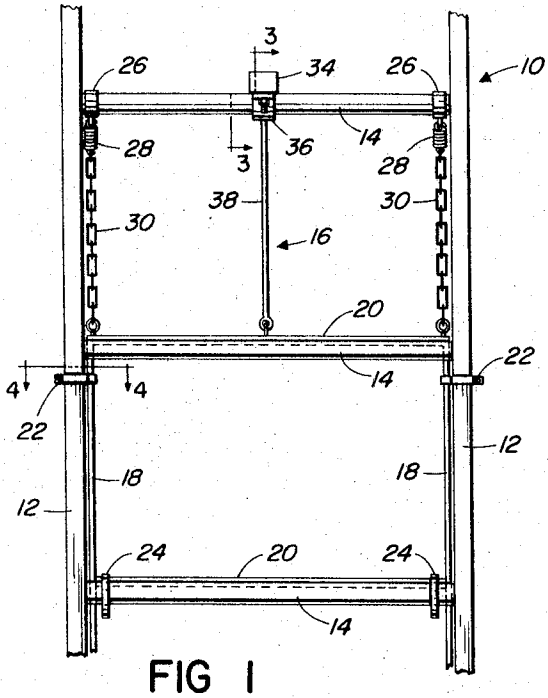


FIG 1

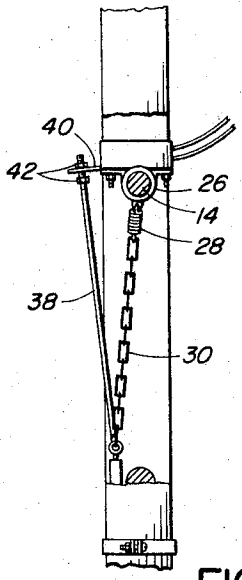


FIG 2

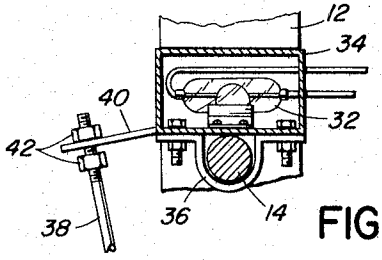


FIG 3

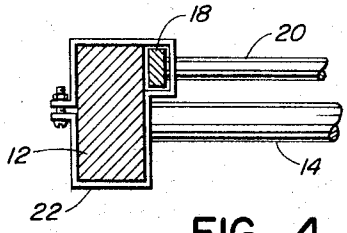


FIG 4

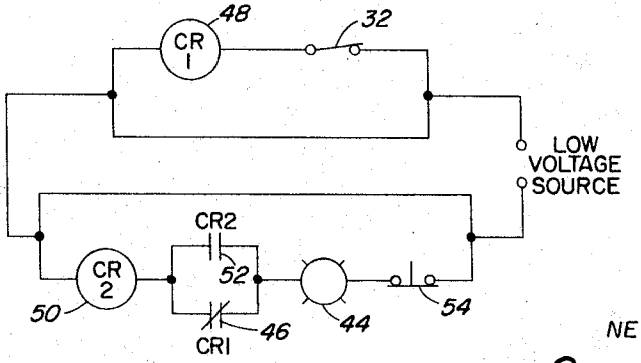


FIG 5

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LADDER WARNING DEVICE

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This invention relates to a warning or signalling device and more particularly to such a device for use in connection with ladders and the like to give a warning when an unauthorized person attempts to climb the ladder.

Ladders are commonly used in connection with water towers, radio and TV towers, grain elevators, fire escapes, etc. so that authorized individuals can climb the structures in order to maintain or repair them. In the case of fire escapes on buildings and the like, of course, the ladders are used for safety reasons and to comply with building and fire codes. Ladders on all such structures, however, make it easy for vandals and other trespassers to deface and damage the structures, resulting in financial loss to the owners and their insurers. In addition, the ladders may be considered attractive nuisances for children, who do not recognize the dangers involved in playing on such structures, and the owners may therefore be liable for injury to children playing on such structures unless reasonable precautions are taken.

There are not known to me any warning devices for use on these structures which will give a signal or warning in the event an unauthorized person climbs the ladder. A warning device of this type should be foolproof and incapable of being rendered inoperative even by a careful trespasser. Moreover, such devices should be convenient to use so that they need not be reset on the site of the structure once they have been activated. This is especially important where the tower or the like is located in a remote area.

It is, therefore, an object of my invention to provide a warning device and signal system for use in connection with ladders and the like which makes it virtually impossible for an intruder or trespasser to climb the ladder without activating the device and thereby giving a warning. If an intruder attempts to deactivate the device, this will also sound an alarm. The device is such that in many cases, the intruder will activate it without knowing it. The device is also completely weatherproof and will not become inoperative under even the most adverse weather conditions. Furthermore, a feature of my novel device and system is that it automatically resets itself and therefore eliminates the necessity of traveling to the site of the structure in order to activate the device. The device is simple, inexpensive, and will remain operative for many years with practically no maintenance.

These and other objects and features of my invention will be readily apparent from a consideration of the following description taken in connection with the accompanying drawings in which:

FIG. 1 is a front elevational view of a portion of a ladder showing my novel device installed thereon;

FIG. 2 is a side elevational view with a portion of the side piece of the main ladder removed in order to show details of my device;

FIG. 3 is a sectional view taken on the line 3—3 of FIG. 1 and showing the mounting for the switch;

FIG. 4 is a sectional view taken on the line 4—4 of FIG. 1 and showing a method of retaining the signal ladder in place; and

FIG. 5 is a schematic wiring diagram of an electrical signal system that can be used in connection with my novel device.

Referring now to the drawings, the main ladder **10** is of any suitable construction and has the usual vertical

side members **12** extending parallel to each other, the side members **12** being joined by a plurality of cross pieces **14** commonly referred to as steps or rungs. The main ladder **10**, of course, is the structure upon which a person climbs placing his hands and feet on the rungs **14** in the usual well-known manner.

Secured to the main ladder **10** for limited vertical movement with respect thereto is the actuating means referred to hereinafter as the signal ladder **16** which is, in effect, a small ladder whose width is slightly less than the distance between the side members **12**. The signal ladder **16** therefore also has vertical uprights **18** joined by cross members **20**. The cross members **20** are spaced apart at approximately the same center-to-center distance as the rungs **14** of the main ladder **10**. The signal ladder **16** is held closely adjacent to the main ladder **10** by retaining means such as brackets **22** which encircle the side members **12** of the main ladder **10** and the vertical uprights **18** of the signal ladder **16**. The brackets **22** are secured tightly to the side members **12** but the vertical uprights **18** are free to move up and down within the brackets **22**. Also, to hold the signal ladder **16** close to the main ladder **10**, brackets **24** encircle the rungs **14** and the cross members **20** but permit limited vertical movement of the signal ladder **16** with respect to the main ladder **10**.

The signal ladder **16** is suspended from a rung **14** of the main ladder **10** by hangers **26** to which are connected resilient members such as springs **28** and flexible members such as chains **30**. The signal ladder **16** is preferably suspended behind the main ladder **10** thus partially hiding it from the view of a person climbing the main ladder **10**. The lower end of the chains **30** are connected to the uppermost cross member **20** of the signal ladder **16**. The length of the chains **30** are such that with no external force applied to the signal ladder **16** it will hang with the top edge of each cross member **20** slightly above the top edge of the corresponding rung **14** of the main ladder **10**. The signal ladder **16** should be of a sufficient length, several feet or more, to make it impossible for an individual to climb the main ladder **10** without either stepping on or grasping and depressing one of cross members **20**. The tension of the springs **28** should be such that the weight of ice, birds, etc., will not be sufficient to move the signal ladder **16**. The total weight of the signal ladder **16** itself is very light, and, therefore, it preferably is constructed of lightweight corrosion-resistant materials such as aluminum.

From the description thus far, it will be obvious that any one climbing the main ladder **10** cannot do so without either stepping on or grasping the cross members **20** of the signal ladder **16** and thereby moving the signal ladder **16** slightly downwardly. The cross members **20** and the rungs **14** are overlapped, such as shown in FIG. 1, or the distance between them is such that an individual cannot get his hands or feet between them without raising the signal ladder **16**. Therefore, the signal ladder **16** will be moved either up or down by a trespasser climbing the ladder, and this movement is used to give a perceptible signal. The signal can be produced in many ways but I prefer to mount a small mercury switch **32** inside of a protective enclosure **34** that is supported by means of a U-shaped bracket **36** on top of one of the rungs **14**, preferably the same rung from which the signal ladder **16** is suspended. The opening in the U-bracket **36** is slightly larger than the rung **14** so that the enclosure **34** containing the mercury switch **32** is free to turn on the rung **14**. A rod **38** is pivotally connected at its lower end to the top cross member **20** of the signal ladder **16** and is connected at its upper end to a flange **40** extending outwardly from the enclosure **34**. The rod **38** can be con-

nected to the flange **40** in any suitable manner such as by means of two nuts **42** threaded on the end of the rod **38**, one nut on each side of the flange **40**. Sufficient clearance should be provided between the flange **40** and the nuts **42** to permit the enclosure **34** to pivot without binding on the rod **38**. The position of nuts **42** is adjusted so that when the signal ladder **16** is in its normal position with the top edges of the cross members **20** slightly above the tops of the rungs **14**, the enclosure **34** will be level thus maintaining the mercury switch **32** also level. The mercury switch **32** is preferably of the type which has two contacts which are connected by the ball of mercury when the switch **32** is in a level position. If the switch **32** is tilted in either direction, the mercury will roll to one end of the switch **32** breaking the connection between the two contacts. Switches of this type are well known to those skilled in the art. Obviously, the same result could be accomplished by use of two mercury switches each with both contacts at one end of the switch, or by the use of any other suitable type of switch, such as a limit switch.

It should be noted that if the signal ladder **16** is moved, it will return to its initial position by force of gravity or by action of springs **28**. Thus, the mercury switch **32** will always automatically be reset to close the contacts after the external force is released from the ladder **16**.

From the description thus far, it will be obvious that when a person climbs the main ladder **10** and thereby forces the signal ladder **16** either upwardly or downwardly, the rod **38** will cause the mercury switch **32** to tilt thus breaking the connection normally maintained closed by the switch **32**. This breaking of the connection, when the switch **32** is tied in a circuit, can be used to sound a visual or audible alarm on the protected structure itself or at some remote location. The type of alarm or signal forms no part of my invention since such alarms and signals and the circuits therefor are well known to those skilled in the art. However, for purposes of illustration, I have shown in FIG. 5 a schematic diagram of a circuit which is suitable for use with an alarm on the site of the structure. If the alarm is located at a remote station, it can be tied in with a circuit leased from the telephone company. The circuit employed in either case is preferably a low-voltage, low-amperage type and therefore is subject to the less restrictive requirements of most electrical codes. In the illustrative diagram of FIG. 5, the circuit is supplied from a low-voltage source with the mercury switch **32** normally closed and completing the circuit. The indicator or alarm **44** is in parallel with the mercury switch **32**, but the alarm is not normally energized because the coil **48** of a control relay "CR1" holds open a set of normally-closed contacts **46** that are in series with the alarm **44**. Therefore, as long as the mercury switch **32** remains closed and the coil **48** thereby energized, contacts **46** will remain open and the alarm or signal **44** will not be energized. However, if the mercury switch **32** is opened, coil **48** will become de-energized and contacts **46** will close thereby completing the circuit to the alarm **44**. Simultaneously with closing of contacts **46**, the coil **50** of a second control relay "CR2" will become energized closing normally-open contacts **52** to complete a holding circuit which will maintain the circuit to the alarm **44** even if the mercury switch **32** closes immediately after it was opened. Thus, with this circuit, the mercury switch need be opened only momentarily and the alarm **44** will continue to be given indefinitely. In order to shut off the alarm, I provide a push-button switch **54** which will break the circuit to the alarm **44** and also break the holding circuit. Thus, when a watchman on the site or at the remote alarm station manually operates switch **54**, the circuit will return to its initial condition and will remain in that condition until the mercury switch **32** is again opened. Of course, circuits other than that shown in FIG. 5 could be used so that the alarm would stop after a timed interval, for example.

It will be obvious from the above description that I have provided a foolproof alarm system for preventing unauthorized individuals from climbing a ladder. The signal ladder **16** cannot be climbed around if made sufficiently high, and if the signal ladder **16** is either raised or lowered or if someone attempts to remove it, the mercury switch **32** will be opened sounding the alarm continuously on the site or at a remote station until the alarm is manually shut off. Whether raised or lowered the signal ladder **16** will automatically reset itself in proper position by reason of the springs **28** which will also return the mercury switch **32** to a level position and thus close the alarm circuit. Thus, if the alarm **44** is located at a remote station, it is not necessary to travel to the site to reset the system or the device regardless of the number of times the circuit is opened and the alarm operated. The device and the system is extremely simple and very inexpensive to manufacture, and even under all types of adverse weather conditions will remain operative. For example, formations of ice will not render the device inoperative because they would be broken by the relative movement between the signal ladder **16** and the main ladder **10**. If an authorized person desires to climb the ladder, he merely has to call the remote station to let them know that the alarm will be sounded or provision can be made to deactivate it on the site.

Having thus described my invention, it will be obvious to those skilled in the art that various revisions and modifications can be made in the illustrated embodiment of the device and system without departing from the spirit and scope of the invention. It is my intention, however, that any such revisions and modifications as are obvious to those skilled in the arts will be included within the scope of the following claims.

I claim:

1. A warming device for a main ladder or the like having steps which a person can climb, said warning device comprising a signal ladder having cross-members positioned adjacent said main ladder with the top surfaces of said cross-members normally slightly above the top surfaces of the adjacent corresponding steps of the main ladder, resilient support means for said signal ladder which provides for limited vertical movement of said signal ladder while maintaining it in its normal position in the absence of any external force thereon, and signal means operable by movement of said signal ladder from its normal position.

2. The warning device of claim **1** in which said signal ladder is suspended from a step of said main ladder.

3. The warning device of claim **1** in which said signal means includes an electrical circuit containing a mercury switch and an indicator, said switch being mounted on said main ladder and an operating rod interconnecting said switch and said signal ladder so that said switch is operated by movement of said signal ladder, said indicator giving a perceptible signal in response to operation of said switch.

4. A warning device for a ladder or the like having a plurality of steps which a person can climb, said warning device comprising an actuating member positioned closely adjacent each of a plurality of consecutive steps of said ladder, each of said members being of a width substantially the same as the corresponding one of said steps and normally positioned so as to be engaged and moved by a person climbing the ladder and grasping or stepping on one of said steps, said actuating members being connected together and movable as an actuating unit, resilient support means for said actuating unit which maintains said actuating members in normal position while providing for limited movement of said unit, and signal means operatively connected to said actuating unit and operable by movement of an actuating member from its normal position.

5. The warning device of claim **4** in which said actuating unit comprises a second ladder mounted behind

the other ladder and having a plurality of cross-members positioned adjacent the steps of said other ladder with the top surfaces of said cross-members slightly above the top surfaces of the corresponding steps.

6. The warning device of claim 5 in which said resilient support means includes guide means to maintain said second ladder closely adjacent the other ladder and limit relative movement between said ladders to vertical movement.

7. The warning device of claim 6 in which said signal means includes an electrical circuit containing a switch and an indicator, said switch being mounted on said ladders so as to be operated by relative movement between said ladders, said indicator giving a perceptible signal in response to operation of said switch.

8. The warning device of claim 7 in which said switch is located at the upper end of said actuating unit.

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