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FOLDING LADDER AND MULTI-DIRECTIONAL LATCH THEREFOR

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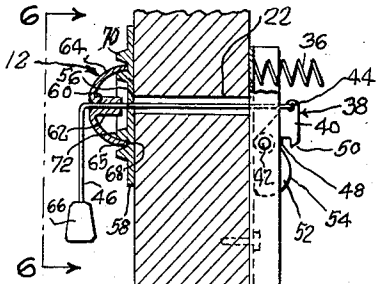


Fig. 5.

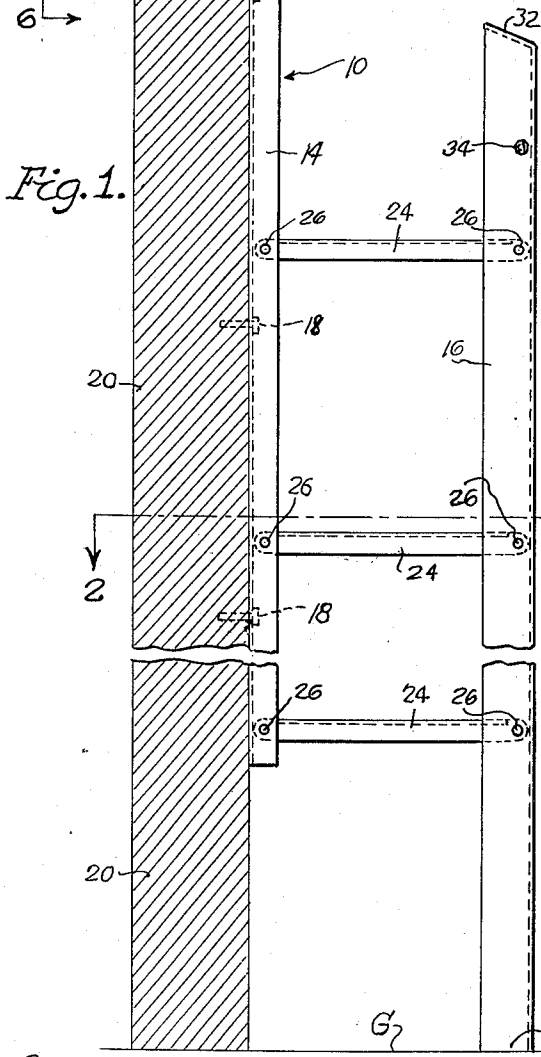


Fig. 1.

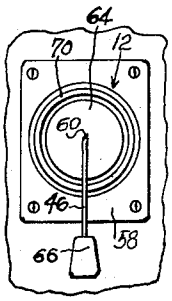


Fig. 6.

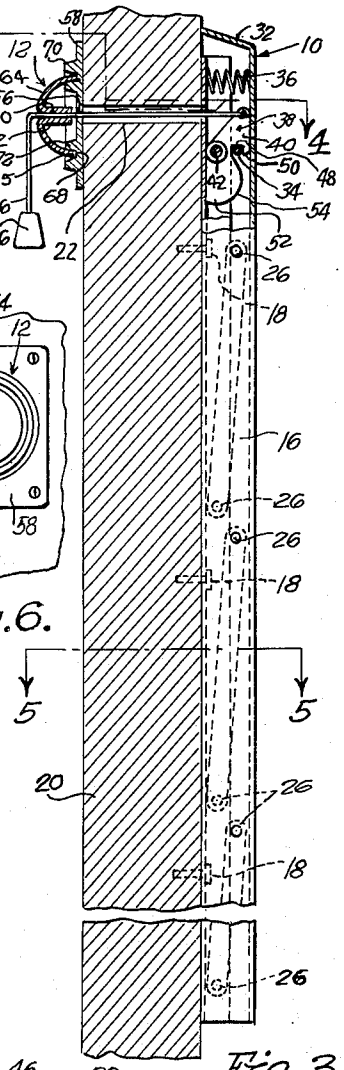


Fig. 3.

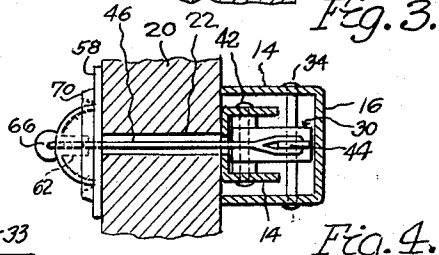


Fig. 4.

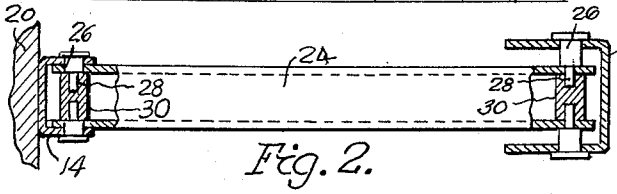


Fig. 2.

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FOLDING LADDER AND MULTI-DIRECTIONAL LATCH THEREFOR

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4 Claims. (Cl. 182—230)

This invention relates to wall ladders and, in particular, to folding wall ladders and latches therefor.

One object of this invention is to provide a folding wall ladder, one side bar or stile of which is secured to a building wall and other is swung in parallelism therewith around the ladder rungs as links, the outer side bar or stile being hollow so as to telescope with and completely cover the inner side bar, thereby concealing and protecting the ladder in its folded condition.

Another object is to provide a pull-operated latch for a folding wall ladder of the foregoing character wherein the latch is operated in response to a pull in any direction, whether upward, downward, sidewise or in a straight line perpendicular to the wall or at any angle thereto.

Another object is to provide a pull-operated latch for a folding wall ladder, as set forth in the object immediately preceding, wherein the latch member is additionally equipped with a cam which forces the movable ladder side bar away from the fixed side bar in the event that the spring normally provided for that purpose fails to exert sufficient force to do so.

Other objects and advantages of the invention will become apparent during the course of the following description of the accompanying drawings, wherein:

Figure 1 is a front elevation of a folding wall ladder and releasing latch according to one form of the invention, with the building wall shown in cross-section and the mid-portion of the ladder omitted to shorten the figure and enable the showing of the parts on a larger scale, with the ladder in its open position;

Figure 2 is a horizontal section taken along the line 2—2 in Figure 1, with the end portions of the ladder rungs broken away to disclose the pivot construction thereof;

Figure 3 is a front elevation similar to Figure 1, but showing the ladder in its raised, folded, concealed and latched position;

Figure 4 is a horizontal section through the latch, taken along the line 4—4 in Figure 3;

Figure 5 is a horizontal section through the folded ladder taken along the line 5—5 in Figure 3; and

Figure 6 is an enlarged elevational view of the pull handle and hemisphere lever of the pull latch, viewed from inside the building in the direction of the arrows 6—6 in Figure 1.

Referring to the drawings in detail, Figures 1 and 3 show a concealed folding wall ladder, generally designated 10, equipped with a pull-operated latch, generally designated 12, according to the invention, in the open and closed positions respectively. The ladder 10 consists of a pair of channel bars or stiles 14 and 16 respectively of sufficiently different sizes (Figure 5) to enable the larger movable channel bar 16 to telescope with and completely cover the fixed side bar 14 of smaller cross-section, and thereby not only conceal the ladder 10 but also protect it from the weather and from unauthorized users. The fixed side bar 14 is bolted or otherwise secured as at 18 to a vertical building wall 20, which is provided near the upper end of the fixed stile 14 with a horizontal hole or bore 22 for the installation of the latch 12, as described more fully below.

The fixed and movable ladder stiles or channel side bars 14 and 16 are interconnected by inverted channel rungs 24 (Figure 2), the sides of which are drilled and pivotally connected to the sides of the channel members 14 and 16 by headed pivot pins 26 inserted therethrough with their inner ends seated in sockets 28 in spacers 30 (Figure 2). The upper end of the outer or movable channel side bar or stile 16 is closed by an inclined top wall 32 which serves as a roof for deflecting snow, rain or other harmful materials. The lower end 33 of the stile 16 swings downward into engagement with the ground G. The ladder stiles 14 and 16 and rungs 24 are preferably formed of weather-resistant material, such as aluminum, aluminum alloys, stainless steel or the like. The outer or folding stile is provided near its upper end with a cross pin or latch keeper 34 (Figures 1 and 4) extending between the side walls thereof, which are drilled for that purpose. Secured to the fixed stile 14 near its upper end and above the latch keeper 34 is the inner end of a compression spring 36, the outer end of which engages the inner wall of the movable channel or stile 16 in the folded and closed position of the ladder 10 (Figure 3).

The pull-operated latch 12 for holding and locking the ladder 10 in its folded position (Figure 3) includes a latch lever 38 having an upper portion 40 in the form of a triangular bell crank plate drilled at its lower rearward corner to receive a pivot pin 42 and at its upper corner to receive and secure the outer end 44 of a flexible pull member 46, such as a cable or chain. The lower forward corner of the triangular plate portion 40 is provided with a keeper notch 48 formed by a keeper tongue or hook portion 50 adapted to hook over the cross pin 34 in the closed position of the ladder (Figure 3). Extending downwardly from and preferably integral with the triangular upper plate portion 40 of the latch lever 38 is a cam portion 52 having a forwardly-projecting eccentric arcuate cam edge 54 which extends outward beyond the sides of the fixed stile or channel bar 14 (Figure 1). The cam portion 52 is also sufficiently heavy to serve as a counterweight to swing the latch lever 38 downward into latching position.

The flexible pull member 46 passes from the latch lever 38 through the wall passageway or bore 22 and through a hole 56 in an escutcheon plate 58 into and through a bore 60 in an internal boss 62 of a dome lever 64 and is fixedly secured to the dome lever 64. The dome lever 64 is in the approximate form of a hollow hemisphere having an annular edge 65, and carries on its inner end a knob or handle 66. The annular edge 65 of the dome lever 64 rests in an annular groove 68 formed between concentric ridges 70 and 72 in the escutcheon plate 58, which is secured to the inner surface of the wall 20.

In the operation of the invention, let it be assumed that the ladder is in its closed, latched and folded position shown in Figure 3, with the outer channel stile 16 of larger cross-section telescoping with and completely covering the inner or fixed stile channel 14 of smaller cross-section (Figure 5) with the edges of the channel stile 16 engaging the wall 20, with the tongue 50 of the latch lever 38 hooked over the cross pin or keeper 34 and with the spring 36 in a compressed condition. To open and unfold the ladder, the operator inside the building having the wall 20 grasps the knob 66 and pulls upon it in any direction.

If the operator pulls downward, sidewise or upward upon the knob 66 and cable 46, the dome lever 64 rocks on its rim 65 as a fulcrum against the bottom of the groove 68 and imparts a bell crank pull upon the inner

portion of the cable **46** within the wall passageway **22**, swinging the latch lever **38** counterclockwise around its pivot pin **42** and lifting the tongue or hook **50** thereof out of engagement with the cross pin or latch keeper **34**. The compressed spring **36** then expands, pushing the movable outer channel stile **16** away from the fixed inner one **14**, while the weight of the channel stile **16** and that of the rungs **24** causes the channel stile **16** to swing downward around the inner pivot pins **26** parallel to the stile **14** until its lower end **33** rests upon the ground G. If for any reason the spring **36** should prove insufficient to separate the stiles **14** and **16**, such as might possibly occur from water freezing as ice between the upper wall **32** of the stile **16** and the wall **20**, a continued pull upon the knob or handle **66** swings the cam edge **54** of the cam portion **52** in a counterclockwise direction around the pivot pin **42** into engagement with the web or bottom wall of the channel stile **16**, forcibly pushing the latter outward and breaking any obstructing material or condition.

To fold the ladder, the operator grasps the outer stile **16** and pushes upward, swinging it from the lowered position of Figure 1 to the raised position of Figure 3, causing the wider channel stile **16** to telescope with the narrower channel stile **14** (Figure 5) and forcing the cross pin or keeper pin **34** beneath the inclined end of the tongue **50**, thereby lifting the triangular portion **40** of the latch lever **38** until the cross pin **34** enters the notch **48** and is thereby locked in the position shown in Figure 3. At the same time, the push of the web or bottom wall of the channel stile **16** against the outer end of the spring **36** compresses the spring **36**.

What we claim is:

1. A multi-directional latch device comprising a base having an arcuate fulcrum abutment portion thereon, a latch operating lever having an arcuate fulcrum portion disposed in engagement with said abutment portion and rockable relatively thereto, a flexible pull member passing through said operating lever and secured intermediate its opposite ends to said operating lever in spaced relationship with said fulcrum portion, a handle secured to one end of said pull member outwardly of said operating lever, a latch support, and a latch pivotally mounted on said support, the other end of said pull member being operatively secured to said latch.

2. A multi-directional latch device according to claim 1, wherein said abutment portion is annular and wherein said operating lever is dome-shaped with its fulcrum portion of annular configuration fitting said annular abutment portion.

3. A multi-directional latch device according to claim 2 wherein said base has concentric retaining ridges disposed respectively inside and outside said fulcrum portion.

4. A multi-directional latch comprising a latch base having a fulcrum abutment portion thereon, a latch operating lever rockably engaging said latch base and having thereon a pull member attachment portion and fulcrum portion spaced away from said attachment portion, said fulcrum portion having thereon a plurality of fulcrum points spaced approximately radially away from said attachment portion and also spaced circumferentially apart from one another, said fulcrum points engaging said lever with said base in fulcruming relationship therebetween, a latch support disposed remote from said latch base and having a pivot element thereon, a latch pivotally mounted on said pivot element, and a pull member secured at longitudinally-spaced locations to said attachment portion and to said latch respectively in spaced relationship with said pivot element.

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