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(11) **EP 0 938 735 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention
of the grant of the patent:

28.05.2003 Bulletin 2003/22

(21) Application number: **97948247.8**

(22) Date of filing: **12.11.1997**

(51) Int Cl.7: **H01H 3/02**, H01H 13/68

(86) International application number:
PCT/US97/20588

(87) International publication number:
WO 98/021732 (22.05.1998 Gazette 1998/20)

(54) **ELECTRIC CIRCUIT ACTUATING MECHANISM**

BETÄTIGUNGS MECHANISMUS FÜR ELEKTRISCHE SCHALTUNG

MECANISME D'ACTIONNEMENT DE CIRCUIT ELECTRIQUE

(84) Designated Contracting States:
DE DK ES FR GB IE IT NL SE

(30) Priority: **12.11.1996 US 747372**
08.08.1997 US 907560

(43) Date of publication of application:
01.09.1999 Bulletin 1999/35

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Description

[0001] This invention relates generally to a safety device for power tools and more specifically to an electric circuit actuating mechanism which when appropriately mounted on a power tool stand, allows the operator to turn on the tool's drive motor by a conscious depression of a relatively small sized actuator, but permits the motor to be turned off by depression of a relatively broad surface by a body part and especially by a body part other than the hands of the operator whereby there is no need for the operator to take his eyes or hands off the work and the cutting or abrading tool.

[0002] U.S. Patent Nos. 3,312,799; 4,166,202; and 4,389,550 (closest prior art) each describe various forms of switch actuating mechanisms including a broad surface panel member of one type or another pivotally mounted in proximity to the operator's station and this member is mechanically linked to the on/off lever of the toggle switch. Once the motor of the tool is turned on, it may be turned off by bumping the broad surface panel member with one or more parts of the operator's anatomy other than his hands and this operation may be accomplished without having to glance away from the working surface of the tool being used. This, of course, leads to greater safety by preventing accidental or inadvertent movement of the workpiece or hands into a position where they may be injured by the tool.

[0003] However, it can be appreciated that due to the hinged mounting of the broad surface in U.S. Patent Nos. 3,312,799; 4,166,202; and 4,389,550, bumping the broad surface member along the edge adjacent and parallel to the pivot axis as well as adjacent to the pivot axis may not cause the broad surface member to pivot and cause actuation of the switch or result in turning off the motor of the tool. Although other manners of mounting the broad surface members are known such as shown in U.S. Patent No. 3,233,071, while reducing the possibility that pushing the broad surface member would not cause actuation of the switch, such arrangements did not eliminate the possibility.

[0004] U.S. Patent No. 5,510,587 describes a form of switch actuating mechanism including a broad surface panel member which overcomes deficiencies of the prior art by enabling any point of the broad surface to move in an actuation direction to de-energize the electric circuit. Specifically, the construction of U.S. Patent No. 5,510,587 utilizes a multiplicity of de-energizing momentary switches which operate a control relay. It can then be appreciated that the control relay and the electric circuit associated therewith as well as the costs of the momentary switches themselves increase the price of the electric circuit actuating mechanism to limit its marketability to industrial and similar commercial applications.

[0005] Further, the fabrication of prior actuating mechanisms tended to be overly costly to manufacture because of the number of parts involved and the difficulty

of assembly, making it somewhat difficult to market at a price commensurate with the cost of the tool on which the safety mechanism was adapted to be used.

[0006] The present invention provides an electric circuit actuating mechanism having the features and characterising features as set out in claim 1.

[0007] Embodiments of the invention will now be described by reference to the accompanying drawings where:

Figure 1 shows a perspective view of an electric circuit actuating mechanism according to the present invention.

Figure 2 shows a cross-sectional view of the electric circuit actuating mechanism of Figure 1 according to section line 2-2 of Figure 1, with portions broken away and shown in phantom to show constructional features.

Figure 3 shows a cross-sectional view of the electric circuit actuating mechanism of Figure 1 according to section line 3-3 of Figure 2, with portions broken away and shown in phantom to show constructional features.

Figure 4 shows a partial, cross-sectional view of the electric circuit actuating mechanism of Figure 1 according to section line 4-4 of Figure 2.

Figure 5 shows a partial, perspective view of the electric circuit actuating mechanism of Figure 1, with portions shown in phantom to show constructional features.

Figure 6 shows a perspective view of an alternate form of an electric circuit actuating mechanism according to the present invention.

Figure 7 shows an exploded, perspective view of the electric circuit actuating mechanism of Figure 6.

[0008] All figures are drawn for ease of explanation only; the extensions of the figures with respect to number, position, relationship, and dimensions of the parts to form the preferred embodiment will be explained or will be within the skill of the art after the following description of the preferred embodiment has been read and understood. Further, the exact dimensions and dimensional proportions to conform to specific force, weight, strength, and similar requirements will likewise be within the skill of the art after the following description has been read and understood.

[0009] Where used in the various figures of the drawings, the same numerals designate the same or similar parts. Furthermore, when the terms "top", "bottom", "first", "second", "inside", "outside", "front", "back", "outer", "inner", "upper", "lower", "height", "width", "length", "end", "side", "horizontal", "vertical", "rear", and similar terms are used herein, it should be understood that these terms have reference only to the structure shown in the drawings as it would appear to a person viewing the drawings and are utilized only to facilitate describing the preferred embodiment.

[0010] An electric circuit actuating mechanism according to the present invention is shown in the drawings and generally designated 10. Mechanism 10 generally includes a housing 12. In the preferred form, housing 12 includes a channel 14 including a planar bottom 16 and first and second planar sides 18 extending generally perpendicularly from the opposite side edges of bottom 16. Housing 12 further includes first and second extensions 20 extending from and outwardly of sides 18. Extensions 20 terminate in first and second planar side walls 22 extending generally parallel to sides 18. An upper end wall 24 extends generally perpendicular between bottom 16, sides 18, extensions 20, and side walls 22. A lower end wall 26 extends generally perpendicular between extensions 20 and side walls 22, with the lower end of channel 14 being open.

[0011] Housing 12 further includes an L-shaped divider 28 having a first plate 30 and a second plate 32 extending generally perpendicular to first plate 30. Plate 30 has a width for slideable receipt between sides 18 and a height generally equal to sides 18. Plate 32 has a width of a size for abutting with the top edges of sides 18 and a length extending from plate 30 to upper end wall 24 parallel to bottom 16 of channel 14. Suitable slides 34 can be formed on sides 18 and bottom 16 for slideable receipt of plate 30. A toggle switch 36 is mounted to plate 30 having a toggle 38 extending from plate 30 in the same direction as plate 32 and a body 40 located on the opposite side of plate 30 than plate 32. Toggle 38 is movable between an on position and an off position, with switch 36 in the on position maintaining the electric circuit and in the off position breaking the electric circuit.

[0012] Mechanism 10 further includes a generally U-shaped actuator 42 having a planar front 44 and first and second legs 46 extending in a spaced parallel relation from the back surface of front 44. Actuator 42 is slideably mounted to plate 32 such as by legs 46 extending through parallel first slots 48 extending from the free edge of plate 32 towards plate 30. In the preferred form, parallel second slots 50 extend from the free edge of plate 32 towards plate 30 parallel to and intermediate slots 48. An ear 52 extends into each of slots 48 adjacent the free edge of plate 32 and extending in a direction opposite to slots 50. Ears 52 abut with the top edge of a slot formed in the upper edges of legs 46. It can then be appreciated that the material of plate 32 between slots 48 and 50 can be flexed sufficiently to allow insertion of legs 46 in slots 48 past ears 52 but will return so that ears 52 capture legs 46 in slots 48 after insertion. A U-shaped actuator guide 54 integrally extends from plate 32 adjacent its free edge and in a direction opposite to plate 30. Guide 54 has a size and shape for slideably receiving front 44 of actuator 42.

[0013] First and second parallel ears 56 integrally extend from plate 32 opposite to guide 54 and on opposite sides of slots 48. A U-shaped bracket 58 is pivotally mounted to ears 56. Bracket 58 is pivotable between a

locked or interfering position extending from ears 56 generally parallel to the slideable movement of actuator 42 and an unlocked or non-interfering position. Bracket 58 includes an L-shaped cam leg 60 integrally extending therefrom. A lock 62 of a commercial variety is mounted to one of sides 18 and includes a latch 64 extending in a non-parallel angle to the rotation axis of lock 62 and located intermediate cam leg 60 and bracket 58. Thus, rotation of lock 62 causes latch 64 to rotate bracket 58 between the locked and unlocked positions. In the locked position as best seen in Figure 5, the free ends of legs 46 of actuator 42 in its outer, non-actuated position terminate in channel 14 and abut with bracket 58 to prevent actuator 42 from being slid inward from its non-actuated position. In its unlocked position, bracket 58 is in a non-interfering position with actuator 42 and actuator 42 is free to slide relative to plate 32 to its actuated position. For ease of assembly, a detent can be formed in one of ears 56 or bracket 58 for slideable receipt in an indent formed in the other of ears 56 or bracket 58 to hold bracket 58 in its locked position during assembly of mechanism 10.

[0014] Third and fourth elongated parallel ears 68 integrally extend from plate 32 opposite to guide 54 and intermediate ears 56 and plate 30. A switch lever 70 is pivotally mounted between ears 68 intermediate its upper and lower ends. Switch lever 70 is suitably connected to actuator 42 so that slideable movement of actuator 42 causes pivotal movement of switch lever 70. In the preferred form, slots 72 are formed in the lower edges of legs 46 of actuator 42 for slideably and pivotably receiving the upper end of switch lever 70. The lower end of switch lever 70 is suitably connected to switch 36 or similar electric control so that pivotal movement of switch lever 70 causes switch 36 to move between its actuated and non-actuated position. Lever 70 is in a suitable operative relation to switch 36 and in the preferred form, a fork 74 is formed on the lower end of switch lever 70 for slideably and pivotably receiving the free end of toggle 38 of switch 36. With actuator 42 in its outer, non-actuated position as shown in Figures 3 and 5, switch lever 70 holds toggle 38 of switch 36 in its non-actuated position. Plate 32 includes an opening 76 formed intermediate guide 54 and plate 30 and generally aligned with switch lever 70.

[0015] Housing 12 further includes a planar divider 78 having a width for slideable receipt between sides 18 and a height generally equal to sides 18. Suitable slides 80 can be formed on sides 18 and bottom 16 for slideable receipt of divider 78. A female electrical outlet 82 is mounted to divider 78. Also an electrical cord 84 including a suitable strain relief extends through divider 78. Suitable electrical connection is made between switch 36, outlet 82, and electrical cord 84 inside of channel 14 intermediate plate 30 and divider 78. A suitable dust cover 86 is provided to close the top opening of channel 14 intermediate plate 30 and divider 78. A suitable cord clamp 88 is provided in channel 14 on the

opposite side of divider 78 than divider 28. Specifically, an electrical cord as shown in phantom in Figure 3 and having a male electrical outlet for connection to outlet 82 can be removably secured by clamp 88 to prevent unintentional removal from mechanism 10.

[0016] Mechanism 10 further includes a mount 90 having a generally U-shape and generally including a generally planar top plate 92 and first and second side plates 94 extending generally perpendicular from the opposite side edges of plate 92. Plate 92 has a width generally equal to and for abutting with the top edges of sides 18 and has a length extending from lower end wall 26 to plate 30. Side plates 94 are slideably received on the outside surfaces of sides 18 and have lower edges which abut with the upper surfaces of extensions 20. Ears 96 are integrally formed on side plates 94. Suitable provisions are made to removably secure ears 96 to extensions 20 such as bolts secured to ears 96 and extending through suitable apertures formed in extensions 20, with nuts threadably received on the bolts and abutting with the opposite sides of extensions 20 than ears 96. It should be noted that dividers 28 and 78 and cover 86 are snapped or slid in place without other forms of securement for ease of assembly, with the securement of mount 90 abutting with and preventing disassembly of dividers 28 and 78 and cover 86 as they are sandwiched between mount 90 and bottom 16 of channel 14.

[0017] First and second parallel ears 98 extend from the upper surface of mount 90 opposite sides 18 and intermediate plate 30 and divider 78. An actuation lever 100 is movably mounted relative to housing 12 and specifically is pivotally mounted between ears 98 intermediate its upper and lower ends for movement between a normal or rest position and an actuation or de-energizing position. Lever 100 is biased from the actuation position to the normal position such as by a spring 102 located between lever 100 and mount 90 and located intermediate the upper end of lever 100 and ears 98. An actuation finger 104 integrally extends from adjacent the upper end of lever 100 and through opening 76 for engaging with toggle 38 and/or switch lever 70 adjacent fork 74. Finger 104 engages lever 70 when switch 36 is in its actuated position and lever 100 is in its normal position. Thus, finger 104 operatively relates lever 100 and switch 36 to de-energize the electric circuit when lever 100 is moved from the normal position to the actuation position.

[0018] Upper and lower, spaced protuberances 106 are integrally secured to each side plate 94 and to ears 96 also integrally secured thereto. In the most preferred form, protuberances 106 are in the form of hollow rectangular parallelepipeds having open bottoms. Each protuberance 106 includes an aperture 108 and a pivot ear 110.

[0019] Mechanism 10 further includes upper and lower actuation arms 112 and 114 pivotably mounted to and between ears 110 about axes which are parallel to but spaced from the axis of actuation lever 100. Actuation

arms 112 and 114 are generally U-shaped and each include an elongated central portion 116 extending parallel to the pivot axis of arms 112 and 114 and each further including first and second legs 118 extending perpendicularly from central portions 116. Upper actuator arm 112 includes a tab 120 which abuts with the upper end of lever 100 in its normal position and with legs 118 extending from portion 116 generally parallel to or at a slight angle upward from top plate 92. It should be appreciated that if one or both legs 118 of arm 112 are pushed to pivot actuator arm 112 so that the free ends of legs 118 move toward extensions 20, tab 120 pushes the upper end of lever 100 towards plate 32 and causes lever 100 to pivot from its normal position to its actuation position. Similarly, lower actuator arm 114 includes a tab 122 which abuts with the lower end of lever 100 in its normal position and with legs 118 extending from portion 116 generally parallel to or at a slight angle upward from top plate 92. It should be appreciated that if one or both legs 118 of arm 114 are pushed to pivot actuator arm 114 so that the free ends of legs 118 move toward extensions 20, tab 122 pushes the lower end of lever 100 away from plate 92 and causes lever 100 to pivot from its normal position to its actuation position. In its most preferred form, arms 112 and 114 are of identical construction to reduce fabrication costs and specifically include both tabs 120 and 122, only one of which is utilized depending upon whether utilized as upper or lower arm 112 and 114.

[0020] Mechanism 10 further includes a cover 124 movable relative to housing 12 and having a front wall including a broad surface. Four pins 126 integrally extend from the rear surface of cover 124 at locations for slideable receipt in apertures 108 of protuberances 106. In the most preferred form, pins 126 have heads 128 formed on the free end of stems 130, with stems 130 having a cross sectional size equal to and for slideable receipt in apertures 108 while heads 128 have an enlarged cross sectional size larger than apertures 108. Heads 128 each include a plurality of axially extending, circumferentially spaced slots 132 which allow heads 128 to be compressed to a size allowing passage through apertures 108 but preventing undesired removal after insertion. Cover 124 is biased away from mount 90 in the preferred form by coil springs 134 positioned on pins 126 and sandwiched intermediate the rear surface of cover 124 and the front surface of protuberances 106. Pins 126 and springs 134 are arranged in a non-linear manner.

[0021] Four tongues 136 integrally extend from the rear surface of cover 124 at locations corresponding to and for abutment with legs 118 spaced from central portions 116. Thus, actuation arms 112 and 114 are in operative relation to lever 100 and also to cover 124 for moving lever 100 from its rest position towards its de-energizing position when any point of the broad surface of cover 124 moves in the actuation direction from the normal position to the actuation position.

[0022] In the most preferred form, cover 124 includes a cutout 138 extending from its upper edge for extending around guide 54 of housing 12. In the most preferred form, the back surface of cover 124 includes a network of ribs 140. It can then be appreciated that ribs 140 increase the strength of cover 124 allowing its formation from reduced thickness materials.

[0023] Housing 12 is preferably fabricated from sheet metal or plastics, as is conventional for electrical switch boxes, with mechanism 10 generally fabricated from plastics in the most preferred form.

[0024] Now that the details of the construction of mechanism 10 have been set forth, consideration will be given to its mode of operation and advantages. As has already been mentioned, the present invention comprises a safety device in the form of electric circuit actuating mechanism 10 for facilitating the control of electrical circuits such as for drive motors or the like commonly used with power tools. For example, the present invention may be used with a wide variety of power tools including table saws, drill presses, lathes, sanders, joiner/planers and the like. Mechanism 10 is mounted at a convenient location proximate the operator's usual work station and power is brought into housing 12 through electric cord 84. The electrical cord for the power tool or the like is plugged into outlet 82 and secured by clamp 88. Due to the solid construction of housing 12 and specifically channel 14, dividers 28 and 78 and dust cover 86 thereof, the interior defined by housing 12 in the most preferred form encloses the electrical components of switch 36, outlet 82, and the electric connections therebetween and with cord 84 and protects them from the environment such as but not limited to sawdust and the like which may be in the air.

[0025] To start the motor, the operator must first unlock mechanism 10 by rotating the key for lock 62. The operator may now depress planar front 44 of actuator 42 to move switch 36 from its off position to its on position to maintain a closed circuit between the power supply and the motor being controlled. It can then be appreciated that actuation of switch 36 does not occur as the result of movement of cover 124.

[0026] All the while, the machine can be running in that switch 36 effected an energization of the electric circuit. When the operator desires to again turn off the motor, he may apply a force either with his hand, but preferably with another part of his anatomy such as his thigh, knee or hip, against the broad front surface of cover 124 to thereby overcome the force of one or more of coil springs 134 and force cover 124 against one or more of legs 118 of arms 112 and/or 114. Depression of cover 124 against legs 118 then causes one or both of arms 112 and 114 to pivot such that switch 36 is moved from its on position to its off position. With switch 36 in its off position, the electrical connection to the motor is broken, disconnecting the motor from the power supply. When cover 124 is released, coil springs 134 return it to its normal position while springs 102 associated with lever

100 ensure that lever 100 and arms 112 and 114 will also be returned to their de-energizing position.

[0027] It can then be appreciated that de-energization of the electric circuit can be accomplished by pushing cover 124 in different manners. Specifically, in the preferred form, as one or more pins 126 can slide through apertures 108 relative to mount 90 against the bias of springs 134, cover 124 is movably mounted relative to housing 12 enabling any point of the broad surface of cover 124 to move in an actuation direction from the normal position to the actuation position, with the front wall being biased from the actuation position to the normal position by springs 134. Particularly, cover 124 can be pushed to move cover 124 adjacent to upper end wall 24 towards housing 12 causing cover 124 to pivot about an axis parallel and adjacent to lower end wall 26 in a similar manner as in U.S. Patent No. 4,389,550. It can be appreciated that the portions of cover 124 adjacent to side walls 22 will move in a non-parallel manner relative to side walls 22. Such movement of cover 124 will pivot arm 112 which in turn pushes the upper end of lever 100 towards housing 12 to thus de-energize the electric circuit. However, unlike U.S. Patent No. 4,389,550, cover 124 can be pushed to move cover 124 adjacent to lower end wall 26 towards housing 12 causing cover 124 to pivot about an axis parallel and adjacent to upper end wall 24. It can be appreciated that the portions of cover 124 adjacent to side walls 22 will move in a non-parallel manner relative to side walls 22. Such movement of cover 124 will pivot arm 114 which in turn pushes the lower end of lever 100 away from housing 12 to thus de-energize the electric circuit. Furthermore, unlike U.S. Patent No. 4,389,550, cover 124 can be pushed to move cover 124 adjacent to one of the first and second side walls 22 towards housing 12 causing cover 124 to pivot about an axis parallel to and adjacent the other of the first and second side walls 22. It can be appreciated that the portions of cover 124 adjacent to end walls 24 and 26 will move in a non-parallel manner relative to end walls 24 and 26. Such movement of cover 124 will simultaneously pivot arms 112 and 114 which in turn pivot lever 100 so that its upper end moves towards housing 12 and the lower end moves away from housing 12 to thus de-energize the electric circuit. Further, unlike U.S. Patent No. 4,389,550, cover 124 can be pushed towards housing 12 adjacent to the upper right corner causing cover 124 to pivot about an axis extending between the left side wall 22 and end wall 26. It can be appreciated that the remaining portions of cover 124 will move in a non-parallel manner from the remaining portions of housing 12. Such movement of cover 124 will engage the right leg 118 of arm 112 to pivot arm 112 which in turn pivots the upper end of lever 100 towards housing 12 to thus de-energize the electric circuit. Similarly, cover 124 can be pushed adjacent its other corners to thereby move switch 36 from its on position to its off position.

[0028] It can then be appreciated that the positioning

of the body part other than the hand such as thigh, knee, or hip on cover 124 is not as accurate as a hand would be, especially when cover 124 is not being viewed and even further under emergency situations where fast actuation is desired. Mechanism 10 then provides a substantial improvement over mechanisms including actuation surfaces which are pivotally mounted through the use of a hinged mounting such as in U.S. Patent Nos. 3,312,799; 4,166,202; and 4,389,550 in the ability to quickly and consistently de-energize the electric circuit. Furthermore, the present invention provides a substantial improvement over mechanisms including actuating surfaces which are not mounted through the use of hinge mountings such as in U.S. Patent No. 3,233,071. Specifically, such mechanisms were not consistent in causing actuation of the switch. For example, in some circumstances, the surface would bottom out by hitting other portions of the mechanism before actuating the switch. Further, considerable travel of the surface would be required especially when pushed at the corner before the switch was actuated, and similarly considerable force would be required in these circumstances especially if a typical start/stop type switch was utilized. Mechanism 10 then takes a novel and unique design direction from prior mechanisms such as shown in U.S. Patent No. 3,233,071. Specifically, lever 100 and arms 112 and 114 are utilized such that the amount of travel of cover 124 and the amount of force to push cover 124 required to actuate switch 36 are minimized. But more importantly, the use of lever 100 and arms 112 and 114 allows the use of one start/stop type switch 36 to be possible and practical. It can then be appreciated that lever 100 and arms 112 and 114 allow different movements of cover 124 to actuate switch 36 especially if movement occurs at the corners of a generally right parallelepiped-shaped mechanism 10 in the most preferred form. Thus, mechanism 10 effectively eliminates the possibility that pushing cover 124 will not cause actuation of switch 36 causing de-energization of the electric circuit and overcomes the disadvantages and limitations of prior mechanisms including but not limited to the types as shown in U.S. Patent Nos. 3,233,071; 3,312,799; 4,166,202; and 4,389,550.

[0029] To lock actuating mechanism 10 and to thereby prevent unauthorized use of the power tool, the operator turns the key for lock 62 which prevents actuator 42 from sliding and removes the key.

[0030] By making front 44 relatively small and by recessing front 44 behind the front surface of cover 124, accidental operation of switch 36 is practically eliminated. It of course can be appreciated that actuator 42 can be located at other positions in housing 12 or other manners can be utilized to energize the electric circuit as long as movement of switch 36 from its off position or energization of the electric circuit does not occur as the result of the movement of cover 124. Once switch 36 is operated to turn the machine on, the operator need not search around for an off switch in that application of a

force anywhere on cover 124 functions to turn off the machine.

[0031] It can then be appreciated that cover 124 formed by walls defining a sleeve which telescopes inside of walls 22, 24, and 26 is believed to be advantageous in making disassembly more difficult. Specifically, if cover 124 were telescoped on the outside of housing 12 such as disclosed in U.S. Patent 3,233,071, the back edges of the cover could be easily flexed outwardly to release the cover from the housing, with such flexing being the result of an object accidentally catching on the back edges or by simply being gripped by the fingers of a vandal which can be a significant problem in a school or similar environment. Due to the construction of mechanism 10, disassembly requires the securement of mount 90 to be removed from extensions 20 allowing access to heads 128, which is very time consuming and also very difficult to perform especially when mechanism 10 is mounted on the work station.

[0032] An alternate form of electric circuit actuating mechanism 10 according to the present invention is shown in Figures 6 and 7 and includes a housing 12'. Housing 12' includes channel 14 having bottom 16, sides 18 and end walls 24' and 26' integrally extending generally perpendicular between and having heights equal to sides 18. End wall 26' mounts outlet 82 and the strain relief for cord 84. End wall 26' further includes first and second slots 150 formed adjacent its top edge and spaced from each other. Standoffs 152 are formed in channel 14 on sides 18 adjacent and parallel to end wall 24' and spaced from end wall 26' and having a height less than the heights of sides 18. Divider 28 has a size for slideable receipt in channel 14, with the height of plate 30 being generally equal to the height of standoffs 152 such that when plate 30 is received in slides 34, plate 32 extends generally parallel to bottom 16. Plate 32 includes apertures 154 generally aligned with standoffs 152.

[0033] Mechanism 10 further includes mount 90' having a generally planar top plate 92' of a size generally equal to and for abutting with the top edges of sides 18 and walls 24' and 26' of channel 14. Ears 156 are integrally formed with the lower surface of top plate 92' for receipt in slots 150 of channel 14 for removably, slideably interconnecting mount 90' to channel 14. Plate 92' further includes apertures 158 generally aligned with standoffs 152 but of a size substantially larger than apertures 154. Ears 160 are integrally formed with the upper surface of top plate 92' generally opposite to ear 156. Ears 162 are integrally formed with the upper surface of top plate 92' adjacent to but spaced from end wall 26'. Slots 164 extend through top plate 92' adjacent to but spaced from divider 28.

[0034] Mount 90' generally includes a frame 166 separately formed from top plate 92' and including protuberances 106 including apertures 108 for slideably receiving stems 130 of cover 124, pivot ears 110 for actuator arms 112 and 114 and pivot ears 98 for actuator

lever 100 of the type as disclosed for mechanism 10 of Figures 1-5. The lower edge of frame 166 includes a flange 168 which is slideably received in ears 162. The upper edge of frame 166 includes hooks 170 for snap type receipt in slots 164 when flange 168 is inserted in ears 162. Thus, frame 166 is removably interconnected or secured to plate 92' by a sliding interfit between ears 162, flange 168, slots 164 and hooks 170 and specifically without the use of screw, threaded, or other types and forms of fasteners. In the most preferred form, actuator lever 100, actuator arms 112 and 114, springs 102 and 134, and cover 124 are assembled to frame 166 before its securement to top plate 92' and before mount 90' is positioned on channel 14. It should then be appreciated that mount 90' can be removed from plate 92' by moving hooks 170 from beneath the lower surface of plate 92' so that they pass through slots 164, with heads 128 being accessible when mount 90' is removed from top plate 92'.

[0035] Housing 12' further includes a lid or cover 172 having an annular collar 174 for abutment with plate 92' opposite to end wall 26' and sides 18 and of a size for slideable receipt of cover 124 so that cover 124 telescopes within collar 174 in a similar manner as cover 124 telescopes inside of walls 22, 24, and 26 of Figures 1-5. The lower edge of collar 174 includes slots 176 for slideable receipt of ears 160 of mount 90' for removably, slideably interconnecting cover 172 to mount 90'. A U-shaped plate 178 extends from the upper edge of collar 174 for abutment with plate 92' of mount 90'. A U-shaped actuator guide 54' integrally extends from plate 178 adjacent its upper edge in a direction parallel to the slide or actuation direction of actuator 42 and integrally extends from collar 174. Guide 54' has a size and shape for slideably receiving front 44 of actuator 42. In the most preferred form, the first and second portions of guide 54' on opposite sides of actuator 42 include apertures 180 which are aligned with apertures 182 formed in legs 46 of actuator 42 in its off position, with apertures 180 and 182 extending in a nonparallel manner and preferably perpendicular to the actuation or slide direction of actuator 42. Thus, the elongated clasp of a conventional padlock 184 can be inserted through apertures 180 and 182 to prevent actuator 42 from sliding from its off position and relative to guide 54' of housing 12'.

[0036] Plate 178 includes sockets 186 generally aligned with standoffs 152 and of a size for slideable receipt within apertures 158 but larger than apertures 154 so that sockets 186 abut with plate 32. Screws 188 pass through sockets 186 and apertures 158 and 154 and are threadably received within standoffs 152 for securing channel 14, mount 90' and cover 172 together at a position spaced from the lower ends of mount 90', cover 172 and channel 14 and from end wall 26'. The heads of screws 188 are located within sockets 186 and have an extent generally equal to or slightly recessed below the outer surface of plate 178. It should then be noted that cover 172 sandwiches plate 92' against the top edge-

es of channel 14, that plate 92' sandwiches divider 28 in channel 14, and that sockets 186 sandwich plate 32 against standoffs 152. In the most preferred form, cover 172 includes an integral skirt 190 integrally extending from its outer periphery and extending over the outer periphery of plate 92' and the top portions of the outer periphery of channel 14.

[0037] Operation of mechanism 10 of Figures 6 and 7 is substantially the same as set forth for mechanism 10 of Figures 1-5. However, actuator 42 is located in its off position and is prevented from sliding to its on position by the clasp of padlock 184 extending through apertures 180 and 182 and thereby preventing movement of legs 46 relative to guide 54'. To start the motor, the operator must first remove the clasp of padlock 184 from apertures 180 and 182. With padlock 184 removed, the operator may now depress planar front 44 of actuator 42 to move switch 36 from its off position to its on position to maintain a closed circuit between the power supply and the motor being controlled. It can then be appreciated that actuation of switch 36 and energization of the circuit does not occur as the result of movement of cover 124.

[0038] It should then be appreciated that housing 12' is particularly advantageous as the various components are snapped or slid in place and secured together with only two screws 188. Specifically, after the proper positioning of actuator lever 100, actuator arms 112 and 114, and spring 102 on frame 166 and springs 134 on pins 126 of cover 124, heads 128 can be snapped through apertures 108 to retain cover 124, lever 100, arms 112 and 114, and springs 102 and 134 to frame 166. At that time, flange 168 can be slid into ears 162 and hooks 170 snapped into slots 164 to secure frame 166 and all the components retained thereon to plate 92'. At that time and after divider 28 and all the components retained thereon have been positioned in channel 14, ears 156 can be inserted into slots 150 and plate 92' pivoted about an axis defined thereby to abut with the top edges of channel 14. At that time, slots 176 can be inserted into ears 160 and cover 172 pivoted about an axis defined thereby to abut with plate 92' of mount 90'. At that time, screws 188 can be extended through sockets 186 and apertures 158 and 154 and threaded into standoffs 152 which prevent pivoting of cover 172 about the axis defined by ears 160 and slots 176 and prevent separation of the components of mechanism 10.

[0039] It can be appreciated that frame 166 can be secured to plate 92' of mount 90' in other manners. As an example, frame 166 could be removably secured to plate 92' by sliding on plate 92' in a plane parallel to plate 92' and into ears arranged in a U-shape and held in position by a detent or hook member. After frame 166 is slid in place, actuator lever 100, actuator arms 112 and 114, and spring 102 could be positioned on frame 166. Cover 124 with springs 134 thereon could then be snapped into position on frame 166. It can be appreciated that after assembly in this manner, access to heads

128 may not be easily available making disassembly difficult if not impossible without damage.

[0040] Many extensions and variations will be obvious to one having ordinary skill in the art. For example, although in the most preferred form, a single switch 36 is utilized to both energize and de-energize the electric circuit, the electric circuit could be separately energized and de-energized. In this regard, a second switch 142 shown in phantom in Figures 3 and 5 could be provided to de-energize the electric circuit. In this regard, switch 142 could be actuated by a protuberance 144 formed on switch lever 70 in the form shown and/or secured to actuation finger 104. Likewise, switches 36 and/or 142 could be of the momentary type, with switch 142 shown in the preferred form of the momentary type.

[0041] Likewise, although outlet 82 and cord 84 are shown in the preferred form mounted to divider 78 or end wall 26', divider 78 and end wall 26' could include knockouts for passage of electric lines so that switches 142 and/or 36 or other electric controls provided in mechanism 10 can be directly wired between the source of power and the power tool or the like being controlled.

[0042] Further, although cover 124 is movably mounted to housing 12 by a multiplicity of pins 126 sliding through apertures 108 and positioning springs 134 between cover 124 and housing 12 in the preferred form, other manners of movably mounting cover 124 relative to housing 12 and which enables any point of the broad surface to move in the actuation direction can be utilized including but not limited to springs or other biasing members spaced from pins 126, the construction shown in U.S. Patent No. 5,510,587, or the like.

Claims

1. Mechanism for actuating an electric circuit including a housing (12, 12'), a front wall (124) having a broad surface, means (108, 126, 134) for mounting the front wall (124) relative to the housing (12, 12') for movement between a normal position and an actuation position, with the front wall (124) being biased from the actuation position to the normal position, a switch (36) mounted to the housing (12, 12'), and an actuation member (100) mounted relative to the housing (12, 12') for movement between a rest position and a de-energizing position, with the actuation member (100) being biased from its de-energizing position to its rest position, with the actuation member (100) being in operative relation to the switch to de-energize the electric circuit when the actuation member (100) is moved from the rest position to the de-energizing position, with the energizing of the electric circuit not occurring as the result of the movement of the front wall (124); **characterized in that** the front wall mounting means (108, 126, 134) enables any point of the broad surface to be moved in an actuation direction from the

normal position to the actuation position; and by means (112, 114) in movable operative relation between the actuation member (100) and the front wall (124) for moving the actuation member (100) from the rest position towards the de-energizing position when any point of the broad surface is moved in the actuation direction from the normal position to the actuation position.

2. The electric circuit actuating mechanism of claim 1 wherein the housing (12, 12') comprises, a channel (14) having first and second planar sides (18) extending from a bottom (16); and a first divider (28) slideably received between the first and second planar sides (18) and abutting with the bottom (16) of the channel (14), with the switch (36) being mounted to the first divider (28).
3. The electric circuit actuating mechanism of claim 2 wherein the first divider (28) extends between the first and second planar sides (18) parallel to the bottom (16) of the channel (14); and wherein the electric circuit actuating mechanism further comprises, an actuator (42) slideably mounted to the first divider (28) for movement between an actuated position and a non-actuated position, with the actuator (42) terminating in the channel (14); and means (70) mounted to the first divider (28) for movement with the actuator (42) for energizing the electric circuit when the actuator (42) moves from the non-actuated position to the actuated position.
4. The electric circuit actuating mechanism of any preceding claim wherein the actuation member (100) is mounted to the housing (12, 12') for pivotal movement about a pivot axis between the rest position and the de-energizing position; and wherein the actuation member moving means (112, 114) pivots the actuation member (100) when any point of the broad surface (124) moves in the actuation direction.
5. The electric circuit actuating mechanism of any preceding claim wherein the actuation member (100) is pivotally mounted to the housing (12, 12') intermediate first and second ends, with the first end moving towards the housing (12, 12') and the second end moving away from the housing (12, 12') when the actuation member (100) is pivoted from the rest position to the de-energizing position.
6. The electric circuit actuating mechanism of any preceding claim wherein the actuation member moving means comprises, first and second actuation arms (112, 114) pivotally mounted to the housing (12, 12') about spaced axes, with each of the actuation arms (112, 114) including first and second legs (118) extending therefrom for engaging with the

- front wall (124) and a tab (122) for engaging with the actuation member (100).
7. The electric circuit actuating mechanism of any one of claims 3 to 6 further comprising a lock (L84) for preventing the actuator (42) from sliding from the non-actuated position, **characterized in** an actuator aperture (182) in the actuator (42) extending in a nonparallel manner to the slide actuation direction; a housing aperture (180) formed in the housing (12') aligned with the actuator aperture (182) when the actuator (42) is in the non-actuated position, with the lock (184) being removably received in the actuator and housing apertures (180, 182) when the actuator (42) is in the non-actuated position, with the actuator (42) being free to slide when the lock (184) is removed from the actuator and housing apertures (180, 182).
 8. The mechanism of claim 7 wherein the actuator (42) is generally U-shaped having a front (44) and first and second legs (46) extending in a spaced parallel relation from the front (44), with the actuator aperture (182) extending through the first and second legs (46) of the actuator (42).
 9. The mechanism of claim 7 or 8 wherein the housing (12') includes a guide (54') having first and second portions on opposite sides of the actuator (42) and extending in a direction parallel to the slide actuation direction, with the housing aperture (180) extending through the first and second portions.
 10. The mechanism of any preceding claim wherein the moving (12') comprises a channel (14) having first and second sides (18) extending from a bottom (16) and at least a first end wall (26'), a mount (90') having a lower end and being of a size for abutting with the channel (14), means for providing a removable interconnection between the mount (90') and the channel (14), a collar (174) of a size for slideable receipt of the front wall (124), and means for securing the channel (14) and mount (90') together at a position spaced from the lower ends and the first end wall (26'); **characterized by** a lid (172) having a lower end and the collar (174); in that the means for providing the removable interconnection between the mount (90') and the channel (14) provides a removable slideable interconnection between the lower end of the mount (90') and the first end wall (26'); and in means (160, 176) for providing a removable slideable interconnection between the lower ends of the lid (172) and the mount (90'); and in that the securing means (188) secures the channel (14), mount (90') and lid (172) together.
 11. The mechanism of claim 10 wherein the securing means comprises, at least a first standoff (152) formed in the channel (14) spaced from the first end wall (26'); a first aperture (158) formed in the mount (90'); a first aperture (186) formed in the lid (172); and a fastener (188) extending through the first apertures (158, 186) and threaded into the standoff (152).
 12. The mechanism of claim 10 or 11 wherein the means for providing a removable slideable interconnection between the lower end of the mount (90') and the first end wall (26') comprises, at least a first ear (156) formed on one of the mount (90') and the first end wall (26'); and a slot (150) for slideably receiving the first ear (156) formed on the other of the mount (90') and the first end wall (26').
 13. The mechanism of any claim 10 to 12 wherein the means for providing a removable slideable interconnection between the lower ends of the mount (90') and the lid (172) comprises, at least a first ear (160) formed on one of the mount (90') and the lid (172); and a slot (176) for slideably receiving the first ear (160) formed on the other of the mount (90') and the lid (172).
 14. The mechanism of any claim 10 to 13 wherein the mount (90') comprises, a top plate (92') and a frame (166) separately formed from the top plate (92') and interconnected to the top plate (92') by a sliding interfit without other forms of securement, with the front wall (124) being movably mounted to the frame (166).
 15. The electric circuit actuating mechanism of claim 2 wherein the housing (12) further comprises, in combination: a cover (86) extending between the first and second sides (18) of the channel (14); a mount (90), with the front wall (124) being movably mounted to the mount (90), with the actuation member (100) being movably mounted to the mount (90); and means for securing the mount (90) relative to the channel (14) sandwiching the cover (86) against the first and second sides (18) of the channel (14).
 16. The electric circuit actuating mechanism of claim 15 wherein the movably mounting means comprises, in combination: a multiplicity of coil springs (134) which are arranged in a non-linear manner and sandwiched between the mount (90) and the front wall (124); and a multiplicity of pins (130) extending from the front wall (124) and slideably received in apertures (108) formed in the mount (90), with the coil springs (134) positioned around the pins (130).
 17. The electric circuit actuating mechanism of any preceding claim wherein the actuation member (100) is biased by a spring (102) extending between the actuation member (100) and the housing (12, 12').

18. The electric circuit actuating mechanism of any preceding claim further comprising, in combination: a second switch (142) mounted to the housing (12, 12'), with the first switch (36) de-energizing the electric circuit when the front wall (124) moves in the actuation direction, with the second switch (142) energizing the electric circuit.

Patentansprüche

1. Mechanismus zum Betätigen einer elektrischen Schaltung, enthaltend ein Gehäuse (12, 12'), eine Vorderwand (124) mit einer ausgedehnten Oberfläche, Mittel (108, 126, 134) zum Anbringen der Vorderwand (124) relativ zu dem Gehäuse (12, 12') zur Bewegung zwischen einer Normalstellung und einer Betätigungsstellung, wobei die Vorderwand (124) von der Betätigungsstellung zu der Normalstellung hin vorgespannt ist, einen an dem Gehäuse (12, 12') angebrachten Schalter (36) und ein relativ zu dem Gehäuse (12, 12') angebrachtes Betätigungselement (100) zur Bewegung zwischen einer Ruhestellung und einer Trennstellung, wobei das Betätigungselement (100) von seiner Trennstellung zu seiner Ruhestellung hin vorgespannt ist, wobei sich das Betätigungselement (100) in operativer Beziehung zu dem Schalter befindet, um die elektrische Schaltung von einer Stromquelle zu trennen, wenn das Betätigungselement (100) von der Ruhestellung zu der Trennstellung bewegt wird, wobei die Versorgung der elektrischen Schaltung mit Strom nicht als das Ergebnis der Bewegung der Vorderwand (124) eintritt; **dadurch gekennzeichnet, daß** die die Vorderwand anbringenden Mittel (108, 126, 134) jeden Punkt der ausgedehnten Oberfläche in die Lage versetzen, in einer Betätigungsrichtung von der Normalstellung in die Betätigungsstellung bewegt zu werden; und durch Mittel (112, 114) in beweglich operativer Beziehung zwischen dem Betätigungselement (100) und der Vorderwand (124) zum Bewegen des Betätigungselements (100) aus der Ruhestellung in Richtung der Trennstellung, wenn irgendein Punkt der ausgedehnten Oberfläche in der Betätigungsrichtung von der Normalstellung zu der Betätigungsstellung bewegt wird.

2. Betätigungsmechanismus für eine elektrische Schaltung nach Anspruch 1, wobei das Gehäuse (12, 12') einen Kanal (14) mit ersten und zweiten ebenen Seiten (18), welche sich von einem Boden (16) aus erstrecken; und eine erste Trennwand (28) aufweist, welche zwischen der ersten und zweiten ebenen Seite (18) gleitend aufgenommen wird und an den Boden (16) des Kanals (14) anstößt, wobei der Schalter (36) an der ersten Trennwand (28) angebracht ist.

3. Betätigungsmechanismus für eine elektrische Schaltung nach Anspruch 2, wobei sich die erste Trennwand (28) zwischen der ersten und zweiten ebenen Seite (18) parallel zu dem Boden (16) des Kanals (14) erstreckt; und wobei der Betätigungsmechanismus für eine elektrische Schaltung weiter einen Betätiger (42), welcher gleitend an der ersten Trennwand (28) angebracht ist, zur Bewegung zwischen einer betätigten Stellung und einer nicht betätigten Stellung, wobei der Betätiger (42) in dem Kanal (14) endet; und auf der ersten Trennwand (28) angebrachte Mittel (70) zur Bewegung mit dem Betätiger (42) zur Versorgung der elektrischen Schaltung mit Strom, wenn sich der Betätiger (42) von der nicht betätigten Stellung in die betätigte Stellung bewegt, aufweist.

4. Betätigungsmechanismus für eine elektrische Schaltung nach einem der vorstehenden Ansprüche, wobei das Betätigungselement (100) für eine Schwenkbewegung um eine Schwenkachse zwischen der Ruhestellung und der Trennstellung an dem Gehäuse (12, 12') angebracht ist; und wobei die das Betätigungselement bewegenden Mittel (112, 114) das Betätigungselement (100) schwenken, wenn sich irgendein Punkt der ausgedehnten Oberfläche (124) in der Betätigungsrichtung bewegt.

5. Betätigungsmechanismus für eine elektrische Schaltung nach einem der vorstehenden Ansprüche, wobei das Betätigungselement (100) zwischen ersten und zweiten Enden schwenkbar an dem Gehäuse (12, 12') angebracht ist, wobei sich das erste Ende zu dem Gehäuse (12, 12') hin bewegt und sich das zweite Ende von dem Gehäuse (12, 12') weg bewegt, wenn das Betätigungselement (100) aus der Ruhestellung in die Trennstellung geschwenkt wird.

6. Betätigungsmechanismus für eine elektrische Schaltung nach einem der vorstehenden Ansprüche, wobei die das Betätigungselement bewegenden Mittel erste und zweite Betätigungsarme (112, 114) aufweisen, welche schwenkbar um beabstandete Achsen an dem Gehäuse (12, 12') angebracht sind, wobei jeder der Betätigungsarme (112, 114) erste und zweite sich hiervon erstreckende Beine (118) zum Eingreifen mit der Vorderwand (124) und eine Lasche (122) zum Eingreifen mit dem Betätigungselement (100) umfaßt.

7. Betätigungsmechanismus für eine elektrische Schaltung nach einem der Ansprüche 3 bis 6, welcher weiter eine Verriegelung (184) zum Verhindern, daß der Betätiger (42) aus der nicht betätigten Stellung herausgleitet, aufweist, **gekennzeichnet durch** eine Betätigeröffnung (182) in dem Betätiger

- (42), welche sich in einer nichtparallelen Weise bezüglich der Gleitbetätigungsrichtung erstreckt; eine in dem Gehäuse (12') ausgebildete Gehäuseöffnung (180), welche mit der Betätigeröffnung (182) fluchtet, wenn sich der Betätiger (42) in der nicht betätigten Stellung befindet, wobei die Verriegelung entfernbar in den Betätiger- und Gehäuseöffnungen (180, 182) aufgenommen wird, wenn sich der Betätiger (42) in der nicht betätigten Stellung befindet, wobei der Betätiger (42) frei ist, zu gleiten, wenn die Verriegelung (184) aus den Betätiger- und Gehäuseöffnungen (180, 182) entfernt ist.
8. Mechanismus nach Anspruch 7, wobei der Betätiger (42) U-förmig mit einer Vorderseite (44) und ersten und zweiten sich in einer beabstandeten parallelen Beziehung von der Vorderseite (44) aus erstreckenden Beinen (46) ist, wobei sich die Betätigeröffnung (182) durch die ersten und zweiten Beine (46) des Betätigers (42) erstrecken.
9. Mechanismus nach Anspruch 7 oder 8, wobei das Gehäuse (12') eine Führung (54') umfaßt, welche erste und zweite Abschnitte auf entgegengesetzten Seiten des Betätigers (42) aufweist und sich in einer Richtung parallel zu der Gleitbetätigungsrichtung erstreckt, wobei sich die Gehäuseöffnung (180) durch die ersten und zweiten Abschnitte erstreckt.
10. Mechanismus nach einem der vorstehenden Ansprüche, wobei das Gehäuse (12') einen Kanal (14) mit ersten und zweiten sich von einem Boden (16) aus erstrecken Seiten (18) und wenigstens einer ersten Endwand (26'), eine Halterung (90'), welche ein unteres Ende aufweist und von einer Größe zum Anstoßen an den Kanal (14) ist, Mittel zum Bereitstellen einer entfernbar Verschränkung zwischen der Halterung (90') und dem Kanal (14), einen Kragen (174) einer Größe zur gleitenden Aufnahme der Vorderwand (124) und Mittel zum Sichern des Kanals (14) und der Halterung (90') zusammen in einer von den unteren Enden und der ersten Endwand (26') beabstandeten Stellung aufweist; **gekennzeichnet durch** einen Deckel (172), welcher ein unteres Ende und den Kragen (174) aufweist; **dadurch**, daß die Mittel zum Bereitstellen einer entfernbar Verschränkung zwischen der Halterung (90') und dem Kanal (14) eine entfernbar gleitende Verschränkung zwischen dem unteren Ende der Halterung (90') und der ersten Endwand (26') bereitstellen; und **durch** Mittel (160, 176) zum Bereitstellen einer entfernbar gleitenden Verschränkung zwischen den unteren Enden des Deckels (172) und der Halterung (90'); und **dadurch**, daß die Sicherungsmittel (188) den Kanal (14), die Halterung (90') und den Deckel (172) zusammen sichern.
11. Mechanismus nach Anspruch 10, wobei die Sicherungsmittel wenigstens ein erstes in dem Kanal (14) ausgebildetes, von der ersten Endwand (26') beabstandetes Abstandsstück (152); eine erste in der Halterung (90') ausgebildete Öffnung (158); eine erste in dem Deckel (172) ausgebildete Öffnung (186) und ein Verbindungselement (188), welches sich durch die ersten Öffnungen (158, 186) erstreckt und in das Abstandsstück (152) geschraubt ist, aufweisen.
12. Mechanismus nach Anspruch 10 oder 11, wobei die Mittel zum Bereitstellen einer entfernbar gleitenden Verschränkung zwischen dem unteren Ende der Halterung (90') und der ersten Endwand (26') wenigstens einen ersten auf entweder der Halterung (90') oder der ersten Endwand (26') ausgebildeten Ansatz (156); und einen auf dem anderen der Halterung (90') oder der ersten Endwand (26') ausgebildeten Schlitz (150) zum gleitenden Aufnehmen des ersten Ansatzes (156) aufweisen.
13. Mechanismus nach einem der Ansprüche 10 bis 12, wobei die Mittel zum Bereitstellen einer entfernbar gleitenden Verschränkung zwischen den unteren Enden der Halterung (90') und des Deckel (172) wenigstens einen auf entweder der Halterung (90') oder dem Deckel (172) ausgebildeten Ansatz (160); und einen auf dem anderen der Halterung (90') oder dem Deckel (172) ausgebildeten Schlitz (176) zum gleitenden Aufnehmen des ersten Ansatzes (160) aufweisen.
14. Mechanismus nach einem der Ansprüche 10 bis 13, wobei die Halterung (90') eine obere Platte (92') und einen getrennt von der oberen Platte (92') ausgebildeten und mit der oberen Platte (92') durch einen gegenseitigen Gleitsitz ohne andere Formen einer Sicherung verschränkten Rahmen (166) aufweist, wobei die Vorderwand (124) beweglich an dem Rahmen (166) angebracht ist.
15. Mechanismus für eine elektrische Schaltung nach Anspruch 2, wobei das Gehäuse (12) weiter in Kombination aufweist: eine Abdeckung (86), welche sich zwischen den ersten und zweiten Seiten (18) des Kanals (14) erstreckt; eine Halterung (90), wobei die Vorderwand (124) beweglich an der Halterung (90) angebracht ist, wobei das Betätigungselement (100) beweglich an der Halterung (90) angebracht ist; und Mittel zum Sichern der Halterung (90) relativ zu dem Kanal (14), wobei die Abdeckung (86) bezüglich der ersten und zweiten Seiten (18) des Kanals (14) sandwichartig aufgenommen wird.
16. Betätigungsmechanismus für eine elektrische Schaltung nach Anspruch 15, wobei die Mittel zum

beweglichen Anbringen in Kombination aufweisen: eine Mehrzahl von Spiralfedern (134), welche in einer nichtlinearen Weise angeordnet und zwischen der Halterung (90) und der Vorderseite (124) sandwichartig aufgenommen werden; und eine Mehrzahl von Stiften (130), welche sich von der Vorderwand (124) aus erstrecken und gleitend in in der Halterung (90) ausgebildeten Öffnungen (108) aufgenommen sind, wobei die Spiralfedern (134) um die Stifte (130) herum angeordnet sind.

17. Betätigungsmechanismus für eine elektrische Schaltung nach einem der vorstehenden Ansprüche, wobei das Betätigungselement (100) durch eine Feder (102), welche sich zwischen dem Betätigungselement (100) und dem Gehäuse (12, 12') erstreckt, vorgespannt ist.

18. Betätigungsmechanismus für eine elektrische Schaltung nach einem der vorstehenden Ansprüche, welche in Kombination weiter aufweist: einen zweiten an dem Gehäuse (12, 12') angebrachten Schalter (142), wobei der erste Schalter (36) die elektrische Schaltung von einer Stromversorgung trennt, wenn sich die Vorderwand (124) in der Betätigungsrichtung bewegt, wobei der zweite Schalter (142) die elektrische Schaltung mit einer Stromquelle verbindet.

Revendications

1. Mécanisme pour actionner un circuit électrique comprenant un boîtier (12, 12'), une paroi avant (124) ayant une surface large, un moyen (108, 126, 134) pour monter la paroi avant (124) par rapport au boîtier (12, 12') en vue de son mouvement entre une position normale et une position d'actionnement, la paroi avant (124) étant sollicitée de la position d'actionnement à la position normale, un interrupteur (36) monté sur le boîtier (12, 12'), et un élément d'actionnement (100) monté par rapport au boîtier (12, 12') en vue de son déplacement entre une position de repos et une position de coupure, l'élément d'actionnement (100) étant sollicité de sa position de coupure à sa position de repos, l'élément d'actionnement (100) étant en relation fonctionnelle avec l'interrupteur pour couper le circuit électrique lorsque l'élément d'actionnement (100) est déplacé de la position de repos à la position de coupure, la mise sous tension du circuit électrique ne se produisant pas suite au déplacement de la paroi avant (124) ;

caractérisé en ce que le moyen de montage (108, 126, 134) de paroi avant permet à tout point de la surface large d'être déplacé dans une direction d'actionnement, de la position normale à la position d'actionnement ; et par un moyen (112, 114)

en relation fonctionnelle mobile entre l'élément d'actionnement (100) et la paroi avant (124) pour déplacer l'élément d'actionnement (100) de la position d'arrêt vers la position de coupure lorsque n'importe quel point de la surface large est déplacé dans la direction d'actionnement, de la position normale à la position d'actionnement.

2. Mécanisme d'actionnement de circuit électrique selon la revendication 1, dans lequel le boîtier (12, 12') comprend un canal (14) ayant un premier et un deuxième côté plat (18) s'étendant depuis un fond (16), et un premier diviseur (28) reçu à coulissement entre les premier et deuxième côtés plats (18) et venant en appui contre le fond (16) du canal (34), l'interrupteur (36) étant monté sur le premier diviseur (28).

3. Mécanisme d'actionnement de circuit électrique selon la revendication 2, dans lequel le premier diviseur (28) s'étend entre les premier et deuxième côtés plats (18) parallèlement au fond (16) du canal (14), et dans lequel le mécanisme d'actionnement de circuit électrique comprend en outre un actionneur (42) monté à coulissement sur le premier diviseur (28) en vue de son déplacement entre une position actionnée et une position non actionnée, l'actionneur (42) se terminant dans le canal (14), et un moyen (70) monté sur le premier diviseur (28) en vue de son mouvement avec l'actionneur (42) pour mettre sous tension le circuit électrique quand l'actionneur (42) se déplace de la position non actionnée à la position actionnée.

4. Mécanisme d'actionnement de circuit électrique selon l'une quelconque des revendications précédentes, dans lequel l'élément d'actionnement (100) est monté sur le boîtier (12, 12') en vue de son mouvement pivotant autour d'un axe de pivot entre la position de repos et la position de coupure, et dans lequel le moyen de déplacement (112, 114) d'élément d'actionnement fait pivoter l'élément d'actionnement (100) lorsque n'importe quel point de la surface large (124) se déplace dans la direction d'actionnement.

5. Mécanisme d'actionnement de circuit électrique selon l'une quelconque des revendications précédentes, dans lequel l'élément d'actionnement (100) est monté à pivotement sur le boîtier (12, 12') entre une première et une deuxième extrémité, la première extrémité se déplaçant vers le boîtier (12, 12') et la deuxième extrémité s'éloignant du boîtier (12, 12') lorsque l'on fait pivoter l'élément d'actionnement (100) de la position de repos à la position de coupure.

6. Mécanisme d'actionnement de circuit électrique se-

lon l'une quelconque des revendications précédentes, dans lequel le moyen de déplacement d'élément d'actionnement comprend un premier et un deuxième bras d'actionnement (112, 114) montés à pivotement sur le boîtier (12, 12') autour d'axes espacés, chacun des bras d'actionnement (112, 114) comprenant une première et une deuxième branche (118) s'étendant depuis celui-ci pour coopérer avec la paroi avant (124) et une patte (122) pour coopérer avec l'élément d'actionnement (100).

7. Mécanisme d'actionnement de circuit électrique selon l'une quelconque des revendications 3 à 6, comprenant en outre un cadenas (184) pour empêcher l'actionneur (42) de glisser depuis la position non actionnée, **caractérisé par** une ouverture d'actionneur (182) dans l'actionneur (42) s'étendant de manière non parallèle à la direction d'actionnement glissant, une ouverture de boîtier (180) formée dans le boîtier (12') alignée avec l'ouverture d'actionneur (182) quand l'actionneur (42) est dans la position non actionnée, le cadenas (184) étant reçu de manière amovible dans les ouvertures d'actionneur et de boîtier (180, 182) quand l'actionneur (42) est dans la position non actionnée, l'actionneur (42) étant libre de glisser quand le cadenas (184) est retiré des ouvertures d'actionneur et de boîtier (180, 182).

8. Mécanisme selon la revendication 7, dans lequel l'actionneur (42) est de forme généralement en U ayant une partie avant (44) et une première et une deuxième branche (46) s'étendant en relation parallèle espacée par rapport à la partie avant (44), l'ouverture d'actionneur (182) s'étendant à travers les première et deuxième branches (46) de l'actionneur (42).

9. Mécanisme selon la revendication 7 ou 8, dans lequel le boîtier (12') comprend un guide (54') ayant une première et une deuxième partie sur des côtés opposés de l'actionneur (42) et s'étendant dans une direction parallèle à la direction d'actionnement glissant, l'ouverture du boîtier (180) s'étendant dans les première et deuxième parties.

10. Mécanisme selon l'une quelconque des revendications précédentes, dans lequel le boîtier (12') comprend un canal (14) ayant un premier et un deuxième côté (18) s'étendant depuis un fond (16) et au moins une première paroi d'extrémité (26'), un support (90') ayant une extrémité inférieure et étant dimensionné de façon à être en appui avec le canal (14), un moyen pour fournir une interconnexion amovible entre le support (90') et le canal (144), un collet (174) dimensionné de façon à recevoir la paroi avant (124) de manière coulissante, et un moyen pour attacher le canal (14) et le support (90') en-

semble en une position espacée par rapport aux extrémités inférieures et à la première paroi d'extrémité (26') ; **caractérisé par** un capot (172) comportant une extrémité inférieure et le collet (174) ; en ce que le moyen pour fournir l'interconnexion amovible entre le support (90') et le canal (14) fournit une interconnexion coulissante amovible entre l'extrémité inférieure du support (90') et la première paroi d'extrémité (26') ; et par un moyen (160, 176) pour fournir une interconnexion coulissante amovible entre les extrémités inférieures du capot (172) et le support (90') ; et en ce que le moyen de fixation (188) attache le canal (14), le support (90') et le capot (172) ensemble.

11. Mécanisme selon la revendication 10, dans lequel le moyen de fixation comprend au moins un premier centreur (152) formé dans le canal (14) espacé de la première paroi d'extrémité (26'), une première ouverture (158) formée dans le support (90'), une première ouverture (186) formée dans le capot (172), et un dispositif de fixation (188) s'étendant à travers les premières ouvertures (158, 186) et vissé dans le centreur (152).

12. Mécanisme selon la revendication 10 ou 11, dans lequel le moyen pour fournir une interconnexion coulissante amovible entre l'extrémité inférieure du support (90') et la première paroi d'extrémité (26') comprend au moins une première oreille (156) formée sur un élément parmi le support (90') et la première paroi d'extrémité (26'), et une fente (150) pour recevoir à coulissement la première oreille (156) formée sur l'autre élément parmi le support (90') et la première paroi d'extrémité (26').

13. Mécanisme selon l'une quelconque des revendications 10 à 12, dans lequel le moyen pour fournir une interconnexion coulissante amovible entre les extrémités inférieures du support (90') et le capot (172) comprend au moins une première oreille (160) formée sur un élément parmi le support (90') et le capot (172), et une fente (176) pour recevoir à coulissement la première oreille (160) formée sur l'autre élément parmi le support (90') et le capot (172).

14. Mécanisme selon l'une quelconque des revendications 10 à 13, dans lequel le support (90') comprend une plaque supérieure (92') et un cadre (166) distinct de la plaque supérieure (92') et interconnecté à la plaque supérieure (92') par un ajustement glissant sans autre forme de fixation, la paroi avant (124) étant montée de façon mobile sur le cadre (166).

15. Mécanisme d'actionnement de circuit électrique selon la revendication 2, dans lequel le boîtier (12)

comprend en outre, en combinaison : un couvercle (86) s'étendant entre les premier et deuxième côtés (18) du canal (14) ; un support (90), la paroi avant (124) étant montée de manière mobile sur le support (90), l'élément d'actionnement (100) étant monté de manière mobile sur le support (90) ; et un moyen pour fixer le couvercle (86) par rapport au canal (14) prenant en sandwich le couvercle (86) contre les premier et deuxième côtés (18) du canal (14).

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16. Mécanisme d'actionnement de circuit électrique selon la revendication 15, dans lequel le moyen de montage mobile comprend, en combinaison : une multitude de ressorts hélicoïdaux (134) agencés de manière non linéaire et pris en sandwich entre le support (90) et la paroi avant (124), et une multitude de broches (130) s'étendant depuis la paroi avant (124) et reçues à coulissement dans des ouvertures (108) formées dans le support (90), les ressorts hélicoïdaux (134) étant positionnés autour des broches (130).

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17. Mécanisme d'actionnement de circuit électrique selon l'une quelconque des revendications précédentes, dans lequel l'élément d'actionnement (100) est sollicité par un ressort (102) s'étendant entre l'élément d'actionnement (100) et le boîtier (12, 12').

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18. Mécanisme d'actionnement de circuit électrique selon l'une quelconque des revendications précédentes, comprenant en outre, en combinaison : un deuxième interrupteur (142) monté sur le boîtier (12, 12'), le premier interrupteur (36) coupant le circuit électrique quand la paroi avant (124) se déplace dans la direction d'actionnement, et le deuxième interrupteur (142) mettant le circuit électrique sous tension.

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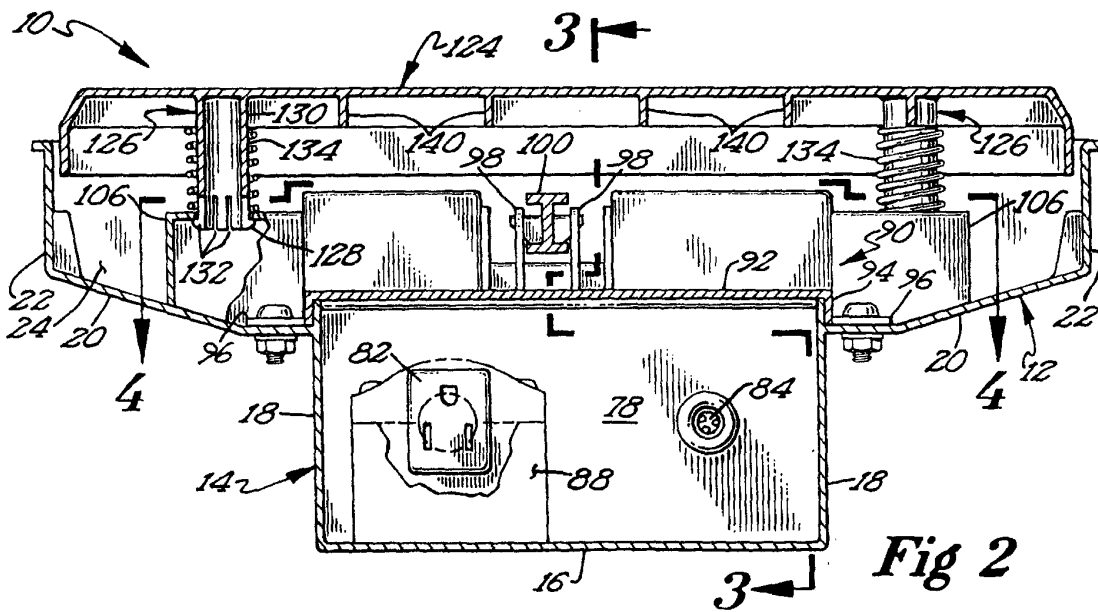
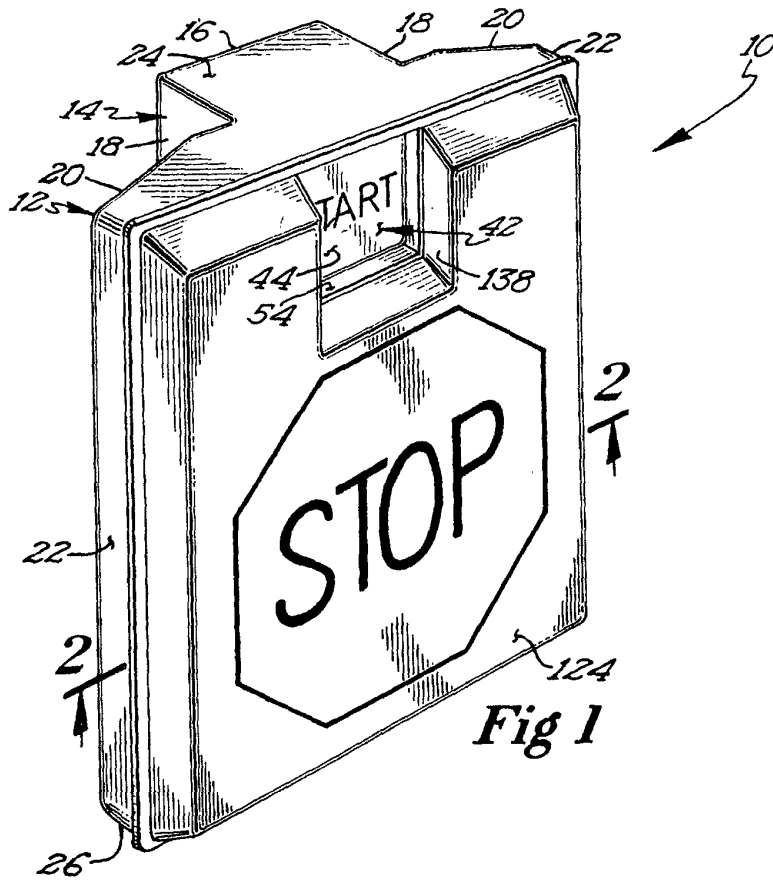
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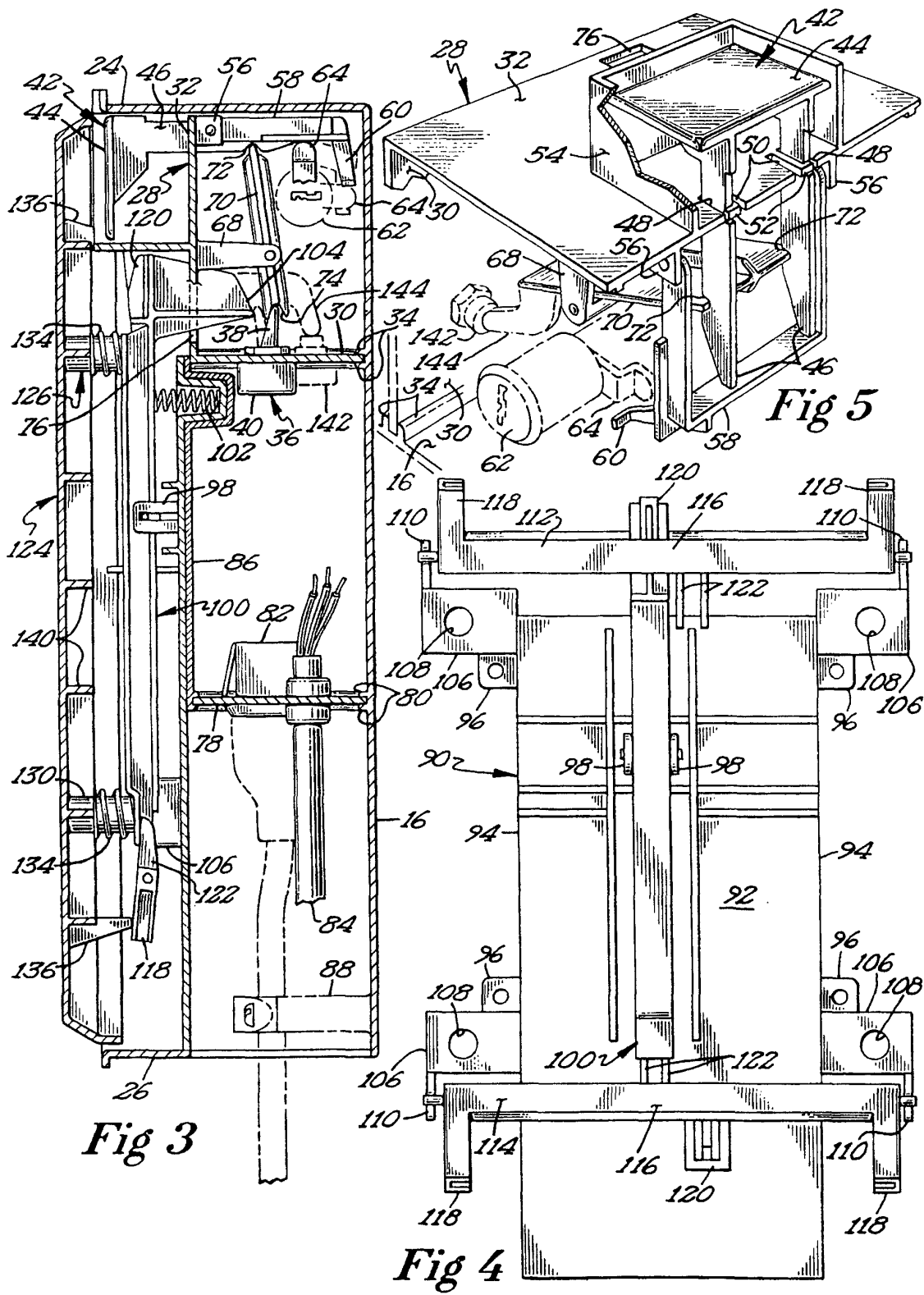
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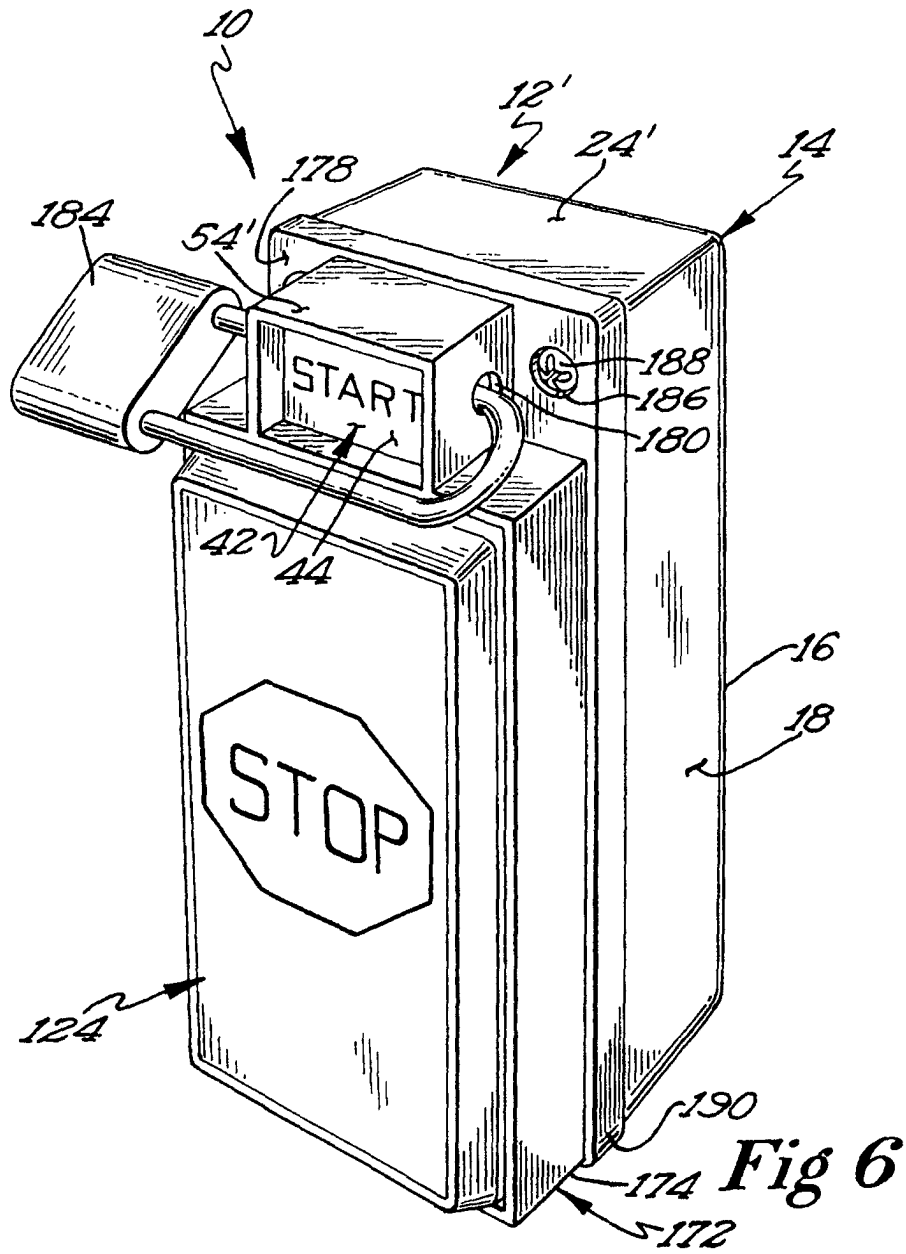
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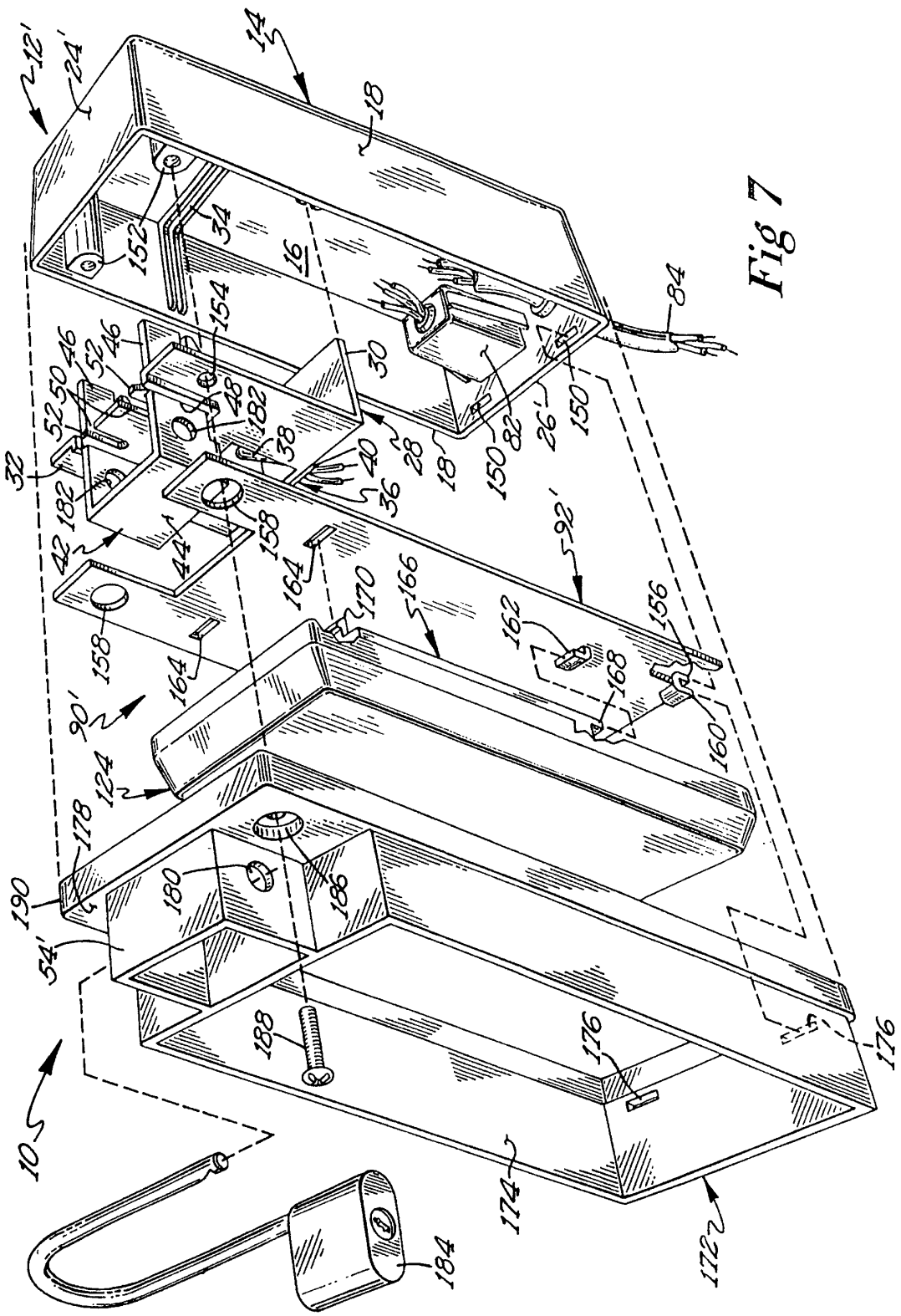


Fig 7