H. F. KRANTZ.

SAFETY PANEL BOX.

APPLICATION FILED MAR. 31, 1917.

1,292,808.

Patented Jan. 28, 1919.

2 SHEETS—SHEET 1.

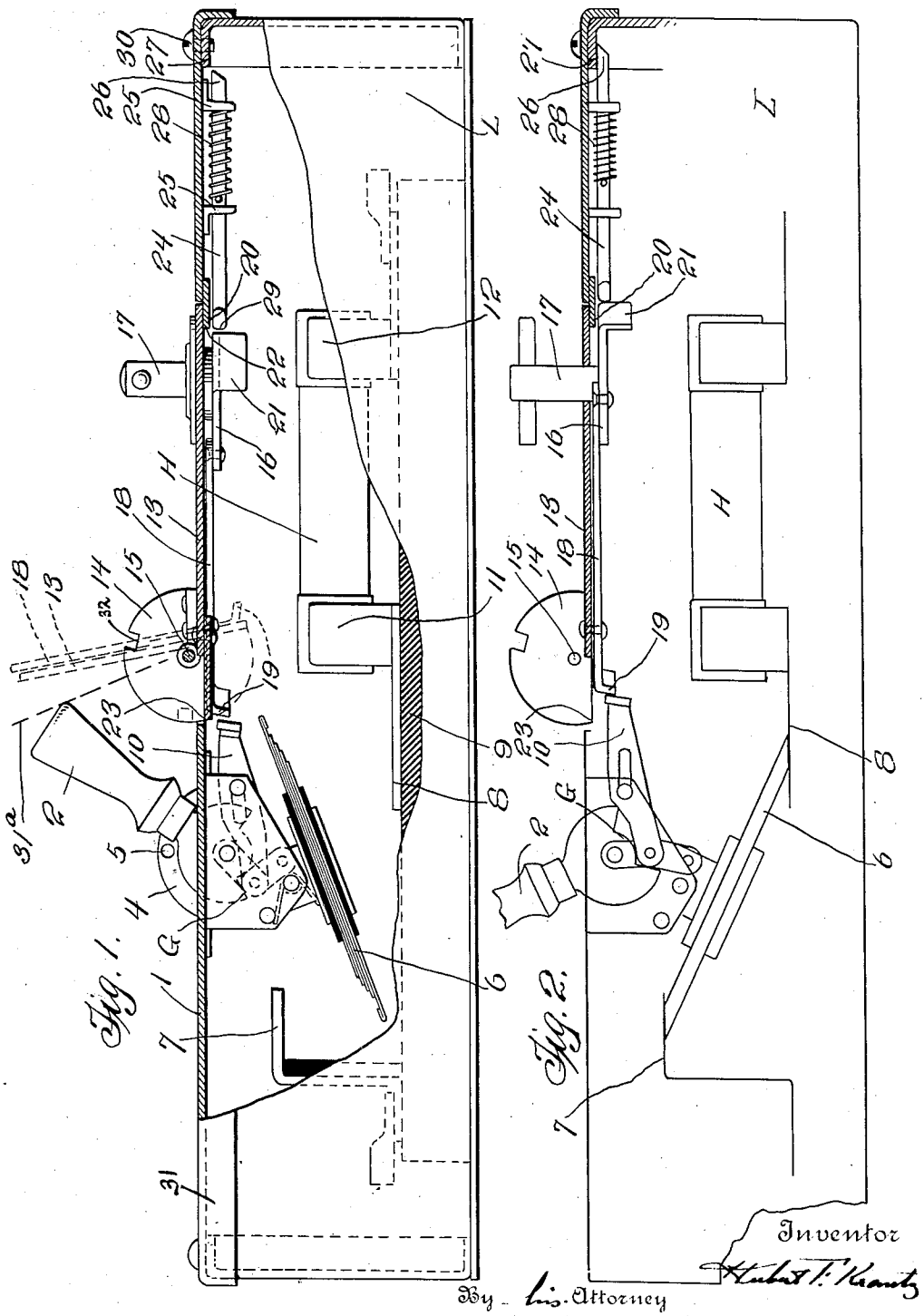


Fig. 1.

Fig. 2.

Inventor

Hubert F. Krantz

By his Attorney

L. Bradford Hardie

H. F. KRANTZ.

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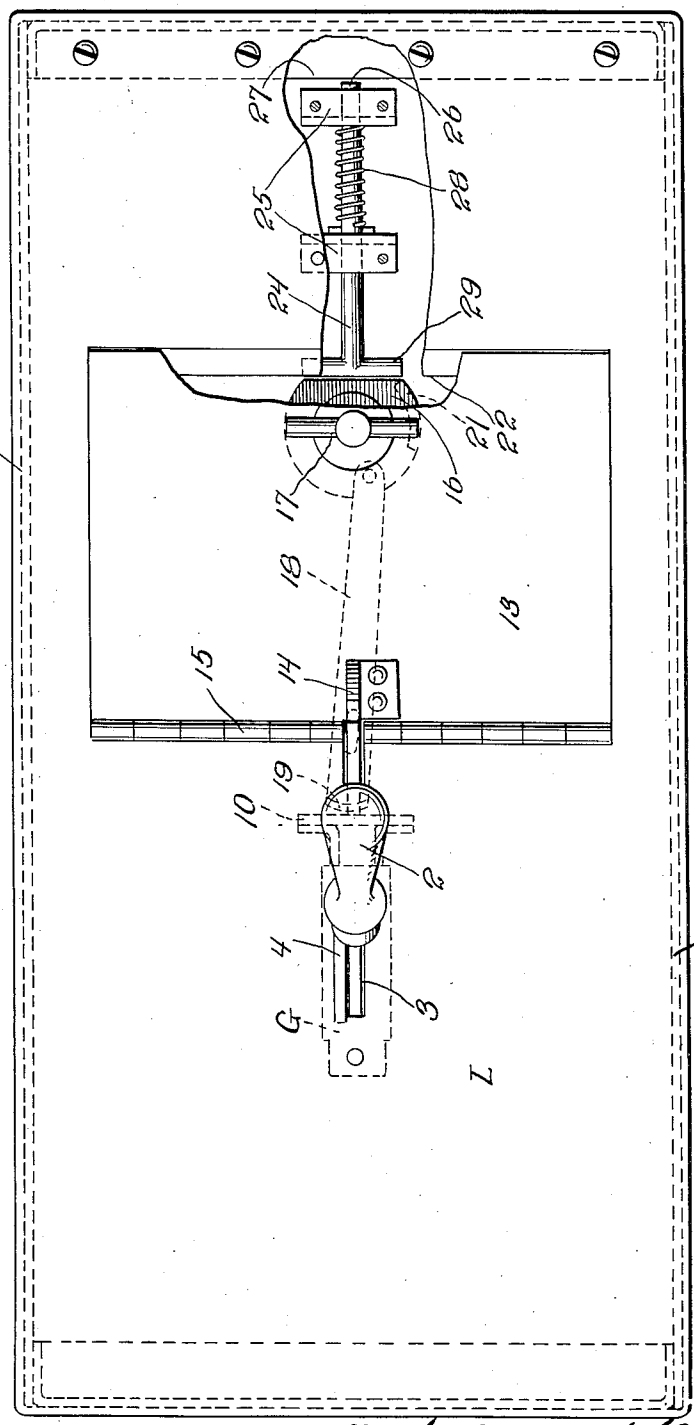


Fig. 3.

Inventor

By his Attorney Hubert F. Krantz

L. Sanford Hawley

UNITED STATES PATENT OFFICE.

HUBERT F. KRANTZ, OF BROOKLYN, NEW YORK, ASSIGNOR TO KRANTZ MANUFACTURING COMPANY, INC., OF BROOKLYN, NEW YORK, A CORPORATION OF NEW YORK.

SAFETY PANEL-BOX.

1,292,808. Specification of Letters Patent. Patented Jan. 28, 1919.

Application filed March 31, 1917. Serial No. 158,957.

To all whom it may concern:

Be it known that I, HUBERT F. KRANTZ, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Safety Panel-Boxes, of which the following is a specification.

This invention relates to a safety panel box and comprises certain modifications and improvements over the structure shown in my co-pending application Serial Number 79,094.

The particular object of the present invention is to provide improved and more uniformly efficient means for rendering the device proof against the undesirable results which might otherwise follow when the device is under the control of an inexperienced operator.

A more specific object is to provide a device having all the advantages, and more, than the device illustrated in the above mentioned co-pending application, but in which the switch mechanism is mounted in a stationary position within the casing rather than being mounted upon and movable with the swinging door.

A further detailed object is to provide means associated with the swinging door in such m..nner as to not only prevent the opening of the door when the switch is in the "on" position but also to positively prevent movement of the switch from the "off" position into the "on" position while the door is open.

A further detailed object is to provide means adapted to prevent movement of the switch from the "off" to "on" position while the door is open, and to include in said means an element adapted particularly to compensate for inaccuracies in manufacture whereby to decrease the amount of care and exactness, and therefore to decrease the expense, incident to the manufacture of the device.

A further object is to provide, in combination with a door and switch controlled latch mechanism therefor, an auxiliary latch mechanism also associated with the switch mechanism for preventing the possibility of dismantling a portion of the box structure while the switch is in the "on" position.

A further object is to provide a safety panel box having a bodily removable cover and to provide that substantially all of the moving parts of the switch mechanism are carried by and removable with said cover for purposes of inspection, repairs, etc.

Other objects and aims of the invention, more or less specific than those referred to above, will be in part obvious and in part pointed out in the course of the following description of the elements, combinations, arrangements of parts and applications of principles, constituting the invention; and the scope of protection contemplated will be indicated in the appended claims.

In the accompanying drawings which are to be taken as a part of this specification, and in which I have shown merely a preferred form of embodiment of the invention:

Figure 1 is a longitudinal vertical sectional view through a panel box constructed in accordance with this invention, parts being illustrated in elevation, the switch being shown in the "off" position.

Fig. 2 is a diagrammatic view illustrating certain of the movable elements of Fig. 1 in the position assumed when the switch is "on"; and

Fig. 3 is a top plan view of the structure shown in Fig. 1, parts being broken away for better disclosing the structural arrangement of the parts.

Referring to the drawings for describing in detail the structure which is illustrated therein, the reference character L indicates the panel box generally. This may be made up of any suitable material, either sheet metal or otherwise, according to preference. In the drawing it is shown as being made from sheet metal. The switch mechanism G is arranged within the box, being preferably fixed to the upper wall 1 of the box and having a handle 2 projecting through an opening 3 formed through said upper wall. If desired, a flange-like part 4 may be formed upon the wall 1 adjacent the handle to provide an opening 5 for the insertion of locking means by which the handle may be locked in either its "on" or "off" position.

The switch mechanism *per se* is substantially the same as that illustrated in the mentioned co-pending application and comprises a swinging double ended contact member 6 adapted to be swung by the handle 2 for

moving its opposite ends into and out of electrical engagement with the stationary contact members 7 and 8 which are arranged within the box, being preferably carried upon a suitable base 9 of insulating material. A toggle is interposed between the handle and the contact member 6 adapted to hold the contact member "on" when the toggle is made, and to permit the contact member to move "off" under the impulse of a suitable spring when the toggle is broken.

A plunger 10 is formed as a part of the switch mechanism. The particular manner of connecting this plunger with the switch mechanism forms no part of the present invention. It is sufficient to say that when the handle 2 is thrown from an "off" to an "on" position the plunger is projected outwardly (compare Figs. 1 and 2). Also that it is impossible to throw the handle from the "off" to the "on" position whenever means is interposed to prevent outward movement of the plunger. One manner of connecting this plunger in the switch mechanism is clearly illustrated in my co-pending application Serial Number 42,956. Here the plunger is connected with the knee of the toggle so as to be moved back and forth as the toggle is broken and made and so as to break the toggle whenever the plunger is forced back.

Within the box is mounted also a fuse as H. This is carried between suitable clips 11 and 12 and is so disposed that when the handle 2 is thrown to the "on" position the electric current will pass from the contact 7 through the member 6 to the contact 8 and thence through the fuse. When the handle 2 is in the "off" position the current is dead ended at the contact 7 and there is no charge whatever either in the contact member 6, or in the member 8, or in the fuse. Hence when the handle 2 is in the "off" position an operator may insert or remove the fuse at will without any danger of receiving a shock. When the handle 2 is in the "on" position, however, it would be dangerous for an operator to insert his hand, or a tool, into proximity with the fuse for any purpose.

For this reason the door, as 13, which is provided as a part of the upper wall 1 of the box just above the fuse position for giving access to the fuse, is furnished with a suitable safety means for preventing any possibility of its being opened while the handle is in the "on" position, and for preventing the handle from being moved from the "off" to the "on" position while the door is open.

This safety means in the present instance comprises first, a semi-circular retaining disk 14 connected to the door concentric with the pivot or hinge 15 of the door. When the door is swung open the peripheral portion of the disk is moved into the path of the plunger 10 so that it becomes impossible to move the plunger outwardly for any appreciable distance, as clearly seen by the dotted lines in Fig. 1. Hence it is apparent that when the door stands open it is impossible to throw the handle 2 from the "off" to the "on" position.

The safety means comprises second, a latch 16 rotatably carried by the door adjacent the free edge thereof. A handle 17 projects through the door by means of which the latch may be turned from a locked to an opened position at the proper time. A link 18 is also connected to the latch and extends along the under surface of the door backwardly beneath the retaining disk 14 to a point in proximity with the end of the plunger 10. The rear end of the link is provided with a shoulder 19 disposed to stand in the path of the plunger. The link is slidably supported upon the door and its forward end is pivotally connected to the latch 16. The point of engagement with the latch is slightly off center, as shown in Fig. 3.

When the handle 2 is in the "off" position and the plunger 10 withdrawn the latch may be rotated at will, but when the handle 2 is in the "on" position and the plunger projected, the link 18 is moved forward so as to rotate the latch into a locked position, as shown in Fig. 2. In this position the forward edge of the latch stands beneath a fixed shoulder 20 formed upon the adjacent edge of the upper wall 1 of the box. The latch cannot be moved from beneath the shoulder 20 unless the plunger 10 be first withdrawn.

Hence the door is closed and positively locked whenever the handle is in the "on" position.

In the manufacture of devices of this general type certain inaccuracies in the disposition of the individual parts inevitably occur unless the most exacting care and inspection is exercised. This means added expense and, as indicated above, it is an object of this invention to provide means for minimizing the care necessary to be exercised in this connection.

With this object in mind, it will be noted that the latch 16 comprises a depending lug 21 which will strike against the edge surface 22 of the shoulder 20 when the door is in a nearly, but not completely, closed position and it is attempted to actuate the handle 2. Unless the corner 23 of the retaining disk 14 is arranged with great nicety in relation to the outer end of the plunger 10, it would be possible for the plunger to clear said corner before the door is completely closed. Without the lug 21 the outward movement of the plunger would force the link 18 forwardly and rotate the latch to the locked position before it had passed beneath the shoulder 20. This would be a very objectionable

condition for two reasons, first, because the door would remain slightly open so that a tool or wire might be accidentally slid between the crack into contact with one of the live parts, and second, since the plunger is moved outwardly beneath the corner 23 of the retaining disk and the door is unlocked, a strong pull by an ignorant hand would derange either the switch mechanism or some part of the door unless the parts be made sufficiently strong to withstand this strain as mentioned hereinafter.

The provision of the lug 21, however, renders it impossible for the latch 16 to rotate at any time while the corner 23 is in its approximately closed position, so that the inaccuracies which inevitably occur during manufacture as above referred to will not detrimentally effect the uniformly efficient operation of the device.

The disk 14 may, if desired, be provided with any suitable device, as for instance the notch 32, to be engaged by appropriate means for retaining the door in one of its positions.

It has been found in practice that it is desirable to provide means, even in addition to the safety means above described, for preventing the partial dismantlement of the box structure. As illustrated, this invention includes such a means and it is shown to be arranged for preventing the possibility of an unauthorized person removing the upper wall of the box while the switch is in the "on" position. This element of the invention may comprise any suitable mechanism and may be arranged and connected in any desired manner, but preferably it includes a bolt 24 slidably mounted in brackets 25 fixed to the under side of the upper wall of the box. The nose 26 of the bolt normally stands in a position to be thrust beneath a fixed shoulder 27 carried by one of the side walls of the box. A spring 28 is disposed for urging the bolt into its normal position. The opposite end of the bolt is provided with a cross head 29 disposed in a position to be engaged by the latch 16 when the latch is rotated to locked position, the rotation of the latch being adapted to slide the bolt against the tension of the spring for projecting the nose 26 beneath the shoulder 27.

Hence whenever the switch is in the "on" position and the door is closed, as it must be when the switch is in the "on" position, then the slide bolt, or auxiliary safety device, is held in a position to lock the top wall to the side wall of the box.

The top wall may be normally held in position by any suitable means as for instance the screws 30. In this connection it is important to note that substantially all of the movable parts of the device are supported and carried by the top wall and are, therefore, bodily removable as an entirety with said top wall for purposes of inspection and repairs, etc. With the top wall detached and removed all of the moving parts carried thereby may be readily operated, the same as when in place upon the box. The door section may be swung back and forth. The latch parts may be operated, and the coöperative relation of the latch parts with the switch movement may be inspected and repairs made if necessary, after which the whole may be returned into connection with the box.

While the slide bolt 24, or other equivalent means connected to be operated by the movement of the link 18 may be sufficient in most cases for retaining the top wall against displacement, nevertheless it will be apparent that the engagement of the switch blade beneath the contact 7 also constitutes a means to prevent removal of the top wall.

When the top wall is in position, and the switch is "on," the engagement of the switch blade with the contact 7 serves as an auxiliary to the slide bolt to constitute a more positive and efficient means for retaining the top wall against displacement. These coöperative parts are further assisted and rendered more efficient by the presence of the depending flange 31 which is formed upon the top wall and which over-laps the adjacent side and end walls of the box in such manner as to prevent any such shifting of the top wall as might enable the slide bolt means or the switch blade to release their hold. The surrounding flange 31 also effectually closes any crack which might occur between the cover and the side and end walls owing to looseness of engagement of the slide bolt with the part 27.

The switch must necessarily be moved "off" before any access whatever can be gained into the box, either through the door opening or by removal of the top wall.

It should be pointed out, as indicated by the dotted line 31^a in Fig. 1, that the outer, or butt, end of the handle 2 may serve as a stop for limiting the opening movement of the door if desired. The fact that the handle is necessarily in the "off" position as in Fig. 1 when the door is open and is positively held in such position, by the disk 14, makes said handle to constitute a positive and satisfactory stop against which the door may rest when thrown open.

As above suggested, if the parts 10, 14, 15, 23, etc., be made of appropriate strength, then engagement of the corner 23 with the upper surface of the part 10 may serve to oppose opening movement of the door. Indeed, this function may become particularly valuable under certain circumstances, for instance in the event of failure of the latch 16 properly to perform its appointed function.

As many changes could be made in this

construction without departing from the scope of the following claims, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative only and not in a limiting sense.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. A device of the class described, comprising a switch mechanism having a part movable into "on" and "off" position, a safety device associated therewith movable into and out of safety position and said safety device and said switch mechanism having parts coöperative first, to prevent movement of the safety device into non-safety position when the switch mechanism is in the "on" position, and second, to prevent movement of the switch mechanism into the "on" position when the safety device is in non-safety position, and an auxiliary safety device for the switch mechanism arranged to be operated by the first safety device.

2. A device of the class described, comprising a switch mechanism movable into "on" and "off" positions, a safety device associated therewith movable into and out of safety position, and an auxiliary safety device for the switch mechanism arranged to be operated by the first safety device.

3. A device of the class described, comprising a panel box having a removable wall, a switch mechanism within the panel box, a safety device associated with the switch mechanism movable into and out of safety position, and means operatively associated with said safety device for locking the mentioned wall against removal when the switch is in the " on " position.

4. A panel box having a movable door and having a movable wall part, a switch mechanism within the panel box, means operatively associated with the door and with the switch mechanism to prevent movement of the switch mechanism to the " on " position except when the door is closed, and means controlled by the switch mechanism to retain the movable wall part in position against movement while the switch is in the "on" position.

5. A panel box having a removable wall part, a movable door forming one part of said wall, a switch mechanism within the box, means for preventing movement of the switch mechanism into the " on " position except when the door is closed, and means also for preventing removal of said wall while the switch mechanism is in the " on " position.

6. A panel box having a removable wall part, a movable door forming one part of said wall, a switch mechanism within the box, means for preventing movement of the switch mechanism into the " on " position except when the door is closed, and means arranged to be operated by the last mentioned means for preventing removal of said wall when the switch is in the " on " position.

7. A device of the class described, comprising a switch mechanism having a part movable into "on" and "off" positions, a safety device associated therewith movable into and out of safety position, said safety device and said switch mechanism having coöperative parts arranged first, to prevent movement of the switch mechanism into the " on " position when the safety device is in non-safety position, second, to permit movement of the switch mechanism to the "on" position when the safety device is in safety position, and said safety device comprising an independent element for preventing movement of the switch mechanism into the " on " position when the safety device is in nearly safety position.

8. A panel box having a pivotally mounted door in one wall thereof, switch mechanism within the panel box adjacent the door having parts movable into " on " and " off " positions, latch mechanism carried by the door having a part disposed in proximity to a moving part of the switch mechanism for moving the latch mechanism into locked position when the switch mechanism is moved into the " on " position, all in combination with retaining means carried by and movable with the door having a part substantially concentric with the axis of the door hinge, disposed to be moved into the path of movement of the movable part of the switch mechanism for preventing movement thereof from the " off " to the " on " position when the door is open.

9. A safety panel box having a door movable into open and closed positions, a switch device, means operable while the door is open a given distance to prevent movement of the switch into " on " position, and independent means operable to prevent movement of the switch into " on " position while the door is open a less distance.

10. A safety panel box having a door movable into open and closed positions, a switch device, a latch to lock the door closed, means operable while the door is open a given distance to prevent movement of the switch into " on " position, and independent means operable to prevent movement of the switch into " on " position while the door is open a less distance, and said last mentioned means being connected with said latch in a manner to move the latch to locking position from the switch after the door is entirely closed.

11. A safety panel box having a door movable into open and closed positions, a switch device, a latch to lock the door closed,

means operable while the door is open a given distance to prevent movement of the switch into "on" position, independent means operable to prevent movement of the switch into "on" position while the door is open a less distance, and said last mentioned means comprising a movable member connected by one end to the latch to impart its movement to the latch and having its other end disposed to receive movement from the switch device after the first mentioned means becomes inoperative, together with means to prevent movement of said member and latch by the switch device except when the door is entirely closed.

12. In a safety panel box having a door movable into open and closed position, a latch device to lock the door closed, and an operable device which it is desired shall not be operated except when the door is closed and locked, the combination therewith of means for preventing operation of said operable device while the door is open, means controllable from said operable device when the door is closed for moving the latch device into locking position co-incident with an operation of said operable device, and said latch device being manually operable and being of a character to hold the door latched until manually released following an operation of said operable device.

13. A safety panel box having a door movable into open and closed positions, a latch to lock the door closed, a switch device, means operable while the door is open a given distance to prevent movement of the switch into "on" position, independent means operable to prevent movement of the switch into "on" position while the door is open a less distance, and said last mentioned means comprising a movable member connected by one end to the latch to impart its movement to the latch and having its other end disposed to receive movement from the switch device after the first mentioned means becomes inoperative.

14. A safety panel box having a door movable in open and closed positions, a latch to lock the door closed, a switch device, means operable while the door is open a given distance to prevent movement of the switch into "on" position, and independent means operable to prevent movement of the switch into "on" position while the door is open a less distance.

15. A safety panel box having a door opening through its upper wall movable into open and closed positions, a switch mechanism within the box, an operating handle for the switch mechanism having one of its ends projecting outwardly through said upper wall whereby to operate the switch mechanism, and connections between the operating handle and the door of a character to require movement of the handle into position disposing the butt end thereof to constitute a stop behind the door for limiting any opening movement of the door.

16. A safety panel box having a removable wall, a contact stationary within said box, a switch blade within the box carried by said wall and removable therewith, operating means for the switch blade partly also within the box operable to move the switch blade into and out of engagement with said stationary contact, said operating means being also carried by and removable with said wall, and said wall comprising in part a door for giving access into the box when said wall is attached, said door being bodily removable with said wall.

17. A safety panel box having a removable wall, a contact stationary within said box, a switch blade within the box carried by said wall and removable therewith, operating means for the switch blade partly also within the box operable to move the switch blade into and out of engagement with said stationary contact, said operating means being also carried by and removable with said wall, said wall comprising in part a door for giving access into the box when said wall is attached, means carried by the door movable with relation to said operating means to prevent operation of said operating means when the door is in one position, and said door being bodily removable with said wall.

18. A device of the class described comprising a wall member made up of a main section and a hinged section, a switch movement fixed to the main section including a movable switch blade and operating mechanism therefor at one surface of said main section and an actuating handle projecting through said main section to the other surface thereof, means carried by the hinged section having a part to coöperate with said operating mechanism for preventing operation thereof when said hinged section is in a given position of swing, and means to which said wall part is detachably connected to complete a box, said means having a contact carried thereby for coöperating with the switch blade within the box.

19. A device of the class described comprising a box having a removable wall, a switch mechanism within the box, a safety guard device associated with the switch mechanism movable into and out of position blocking access to the switch mechanism and said guard device comprising means for effecting retention of said removable wall when the switch is on the "on" position.

20. A device of the class described comprising a box having a removable wall, a switch mechanism within the box, a safety guard device associated with the switch mechanism movable into and out of position blocking access to the switch mechanism,

said guard device comprising means coöperative with the switch mechanism requiring that said guard device be in guarding position when the switch is "on", and said means being coöperative with the switch mechanism also for effecting retention of said removable wall when the switch is in the "on" position.

21. A panel box having a movable door and having a removable wall part, a switch mechanism within the box, and means which is coöperative between the door and the switch mechanism when the door is closed to effect retention of said removable wall part whenever the switch is operated into the "on" position.

22. A device of the class described comprising a box having a removable wall, a switch mechanism within the box, a contact also within the box, the switch mechanism including a switch blade movable into and out of engagement with said contact, said switch blade and contact being of a disposition such that one is interposed directly in the path of the other in a manner to prevent removal of said removable wall while the switch is "on", and other means operable by the switch mechanism also to prevent removal of said removable wall while the switch is "on".

23. A device of the class described comprising a box having a removable wall, a switch mechanism within the box comprising a switch blade movable into "on" and "off" positions, a contact with which said switch blade coöperates, said switch blade and contact constituting means to prevent removal of said wall when the switch blade is "on", and other and different means also for preventing removal of said removable wall when the switch blade is "on".

24. A panel box having a removable wall part and having a movable door, a switch mechanism within the box comprising a switch blade movable into "on" and "off" positions, a contact within the box with which said switch blade coöperates, means coöperative between said door and said switch mechanism to prevent opening of the door when the switch blade is "on", said means being of a character also to effect retention of the removable wall part when the switch is "on", and said switch blade and contact also constituting auxiliary means for preventing removal of said removable wall part when the switch is "on".

25. A panel box having a removable wall, a switch mechanism within the box carried by said removable wall so as to be removable therewith and including a switch blade movable through a given path into "on" and "off" positions, a contact fixed within the box with which said switch blade coöperates, and said contact being interposed in said path of movement of the switch blade so that engagement of the switch blade against the contact will oppose removal of said removable wall when the switch is "on".

26. A panel box having a removable wall part, a switch mechanism within the box carried by said removable wall so as to be removable therewith and including a switch blade having a part movable toward and away from said removable wall, and a contact fixed within the box with which said part of the switch blade coöperates, said contact being interposed in the path of movement of said part of the switch blade between said part of the switch blade and said removable wall to thereby constitute means to prevent removal of said removable wall when the switch is "on".

27. A panel box having a removable wall, a door comprised in said wall for giving access into the box, a switch mechanism arranged within the box, and means carried by said door and extending into coöperation with said switch mechanism for effecting retention of said removable wall when the switch is in the "on" position.

28. A panel box having a removable wall, a door comprised in said wall for giving access into the box, a switch mechanism arranged within the box, a contact within the box with which said switch mechanism cooperates, means carried by the door extending into coöperation with said switch mechanism for effecting retention of said removable wall when the switch is in the "on" position, and said switch mechanism and contact constituting auxiliary means also to prevent removal of the removable wall when the switch mechanism is "on".

29. A panel box having a removable wall, a door comprised in said wall for giving access into the box, a switch mechanism arranged within the box, carried by and removable with said wall, a contact within the box with which said switch mechanism cooperates, means carried by the door extending into coöperation with said switch mechanism for effecting retention of said removable wall when the switch is in the "on" position, said switch mechanism including a switch blade, and said contact being interposed as an obstruction to be engaged by the switch blade also to prevent removal of said removable wall when the switch is "on".

30. A panel box having a removable wall, a switch mechanism arranged within the box including a switch blade movable into "on" and "off" positions, a contact within the box with which said switch blade coöperates, retaining means associated with said switch mechanism operable to interengage between said removable wall and the remainder of the box to prevent removal of the removable wall when the switch mechanism is "on", and said switch blade and contact constituting auxiliary retaining means also to

prevent removal of the removable wall when the switch mechanism is "on", and said removable wall having marginal flanges formed thereon overlapping adjacent portions of the remainder of the box so as to prevent shifting of the removable wall and to thereby render said retaining means and said auxiliary retaining means effective.

31. A panel box having a removable wall, a switch mechanism within the box, movable into "on" and "off" positions, one of the remaining walls of the box providing an overhanging ledge, retaining means carried by said removable wall and operatively connected with the switch mechanism to be projected beneath said overhanging ledge whenever the switch mechanism is operated into "on" position to thereby prevent removal of the removable wall, and a marginal flange formed upon the removable wall overlapping the adjacent portions of the box to prevent shifting of the removable wall and to thereby render said retaining means effective.

32. A device of the class described, comprising a box having a removable wall, a switch mechanism within the box, a contact element also within the box, the switch mechanism including a switch blade element arranged to coöperate with said contact element, connections between said elements and the box and removable wall respectively, means to move one of said mentioned elements through a given path into direct electrical engagement with the other element, and said elements being disposed one directly in said path of movement of the other so that engagement of one with the other will oppose removal of said removable wall while the switch is "on".

33. A panel box having a detachable wall, a switch mechanism within the box movable into "on" and "off" positions, means to operate the switch mechanism, the switch mechanism including parts coöperable to prevent detachment of the detachable wall while the switch mechanism is "on", auxiliary retaining means for said detachable wall to prevent detachment of the detachable wall while the switch mechanism is "on", and means interengaging the detachable wall and the remainder of the box to prevent shifting of the detachable wall and thereby to render both said retaining means effective.

34. A device of the class described, comprising a double-ended switch blade pivotally supported intermediate its ends, a casing for inclosing and protecting said switch blade, operating means for the switch blade by which to swing the switch blade about its pivot into "on" and "off" positions, the casing having a removable wall and said switch blade and said operating means being carried by and removable with said wall, a pair of contacts stationary within the casing with which the switch blade coöperates to close a circuit through said contacts when the switch blade is "on", the two ends of the switch blade engaging the contacts by movement in opposite directions, all of said parts being disposed so that the switch blade will be moved into and out of functioning relation with said contacts by the attachment and removal of the removable wall, and one end of the switch blade serving to retain the removable wall against removal when said end is in engagement with its respective contact.

35. A panel box having a pivotally mounted door in one wall thereof, switch mechanism within the panel box adjacent the door having parts movable into "on" and "off" positions, latch mechanism carried by the door having a part disposed in proximity to a moving part of the switch mechanism for moving the latch mechanism into locked position when the switch mechanism is moved into the "on" position, all in combination with means carried by the door adapted when the switch mechanism is "on" to engage said mentioned moving part of the switch mechanism to oppose opening movement of the door in the event of failure of said mentioned latch mechanism.

36. A safety panel box having a door movable into open and closed positions, a switch device, means operable while the door is open a given distance to prevent movement of the switch into "on" position, independent means operable to prevent movement of the switch into "on" position while the door is open a less distance, and means to oppose opening movement of the door in event of failure of said mentioned independent means.

37. A device of the class described, comprising a switch mechanism having a part movable into "on" and "off" positions, a safety device associated therewith movable into and out of safety position, said safety device and said switch mechanism having coöperative parts arranged first, to prevent movement of the switch mechanism into the "on" position when the safety device is in non-safety position, second, to permit movement of the switch mechanism to the "on" position when the safety device is in safety position, said safety device comprising an independent element for preventing movement of the switch mechanism into the "on" position when the safety device is in nearly safety position, and third, to oppose movement of the safety device to non-safety position in the event of failure of said independent element.

38. A panel box having a pivotally mounted door in one wall thereof, switch mechanism within the panel box adjacent the door having parts movable into "on" and "off" positions, latch mechanism car-

ried by the door having a part disposed in proximity to a moving part of the switch mechanism for moving the latch mechanism into locked position when the switch mechanism is moved into the "on" position, all in combination with retaining means carried by and movable with the door having a part substantially concentric with the axis of the door hinge, disposed to be moved into the path of movement of the movable part of the switch mechanism for preventing movement thereof from the "off" to the "on" position when the door is open, and said retaining means and said movable part of the switch mechanism also having parts disposed to constitute an obstruction to opening movement of the door when the switch is "on".

39. A device of the class described, comprising a switch mechanism having a part movable into "on" and "off" positions, a safety device associated therewith movable into and out of safety position, said safety device and said switch mechanism having coöperative parts arranged first, to prevent movement of the switch mechanism into the "on" position when the safety device is in non-safety position, second, to permit movement of the switch mechanism to the "on" position when the safety device is in safety position, third, to prevent movement of the safety device to non-safety position while the switch mechanism is "on", and fourth, to provide auxiliary means to oppose movement of the safety device into non-safety position while the switch mechanism is "on".

40. A panel box having a detachable wall, a switch mechanism within the box movable into "on" and "off" positions, means to operate the switch mechanism, the switch mechanism including parts coöperable to prevent detachment of the detachable wall while the switch mechanism is "on", and auxiliary retaining means for said detachable wall operatively associated with the switch mechanism to prevent detachment of the detachable wall while the switch mechanism is "on".

41. A panel box having a door displaceable to give access thereto, switch mechanism within the box having an operating handle projecting exteriorly of the box and movable into two positions, and means carried by the door operable to move the switch handle into a position constituting a stop for limiting opening movement of the door.

In testimony whereof I affix my signature in the presence of two witnesses.

HUBERT F. KRANTZ.

Witnesses:
JOHN L. KOLLE,
J. A. NEWTON.