

Nov. 25, 1947.

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2,431,607

HINGE CONSTRUCTION

Filed May 25, 1944

2 Sheets-Sheet 1

Fig. 1

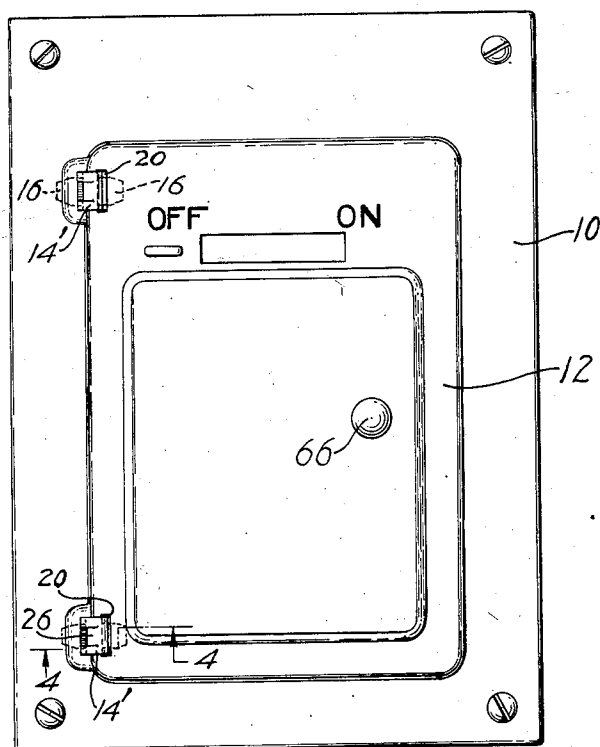


Fig. 2

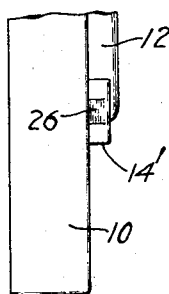


Fig. 3

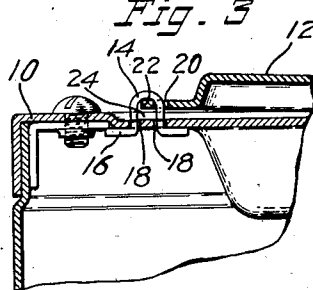
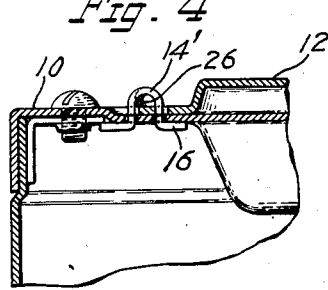


Fig. 4



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Nov. 25, 1947.

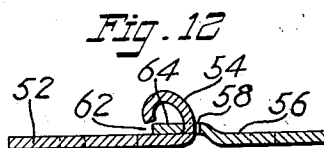
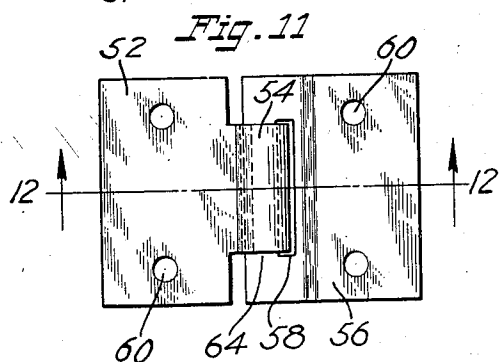
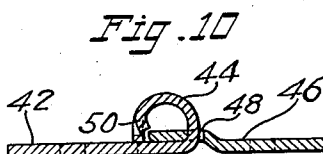
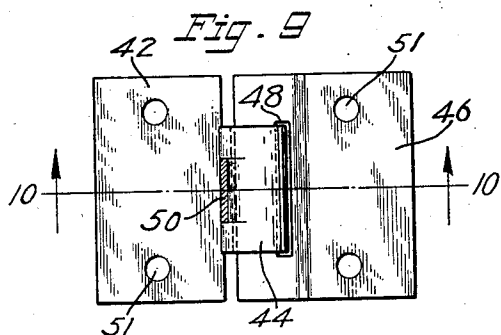
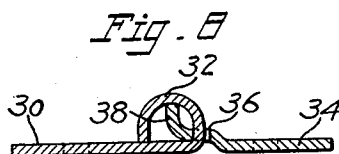
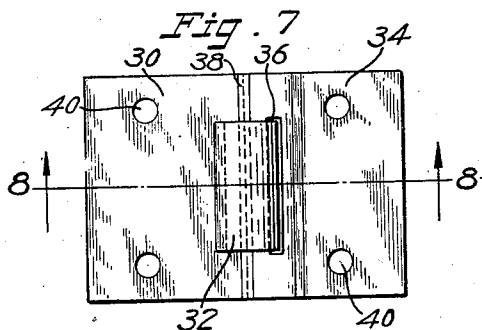
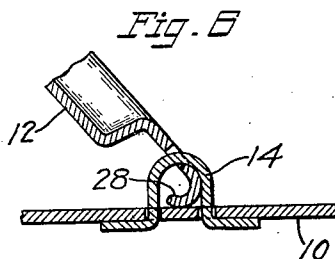
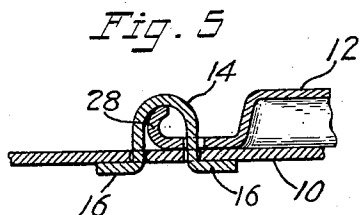
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Filed May 25, 1944

2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,431,607

HINGE CONSTRUCTION

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Application May 25, 1944, Serial No. 537,254

2 Claims. (Cl. 16—128)

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This invention relates to a hinge construction. More particularly, though not restrictively, the hinge construction is of the type which is useful in electric switch boxes and casings for the purposes of hinging either the main or auxiliary doors to panels on said boxes and casings.

It is an object of the invention to provide a hinge construction which is preferably formed from sheet metal stampings which may be inexpensively fabricated to provide hinges which will pivotally connect either the main or auxiliary door to a panel on a switch box and prevent relative movement between the hinged edge of said door and the box in a direction normal to the plane of the door when the door is in closed position.

It is another object of the invention to provide in an inexpensively fabricated hinge, having normally loosely connected leaves, means to compensate for the loose connection between the leaves when the same are in a predetermined relationship, whereby the hinge functions as a more expensive hinge such as is provided with accurately fitting bearings and a pivot pin.

It is a still further object of the invention to provide the hinge leaves with connecting means which may comprise either a separate element secured to one leaf or an element formed integrally with one of the leaves without sacrificing the benefits of any of the foregoing objects of the invention.

The details of the foregoing objects as well as other objects and the details of the invention are set forth in the following specification and illustrated in the accompanying drawings.

The accompanying drawings show the embodiments of the invention which are deemed preferable, but it will be understood that the drawings are intended for illustrative purposes only and are not to be construed as defining or limiting the scope of the invention, the claims forming a part of this specification being relied upon for that purpose.

In the drawings,

Fig. 1 is a vertical elevation of the front panel of a switch box provided with a door or cover connected to said panel by hinge means including the principles of one embodiment of the present invention.

Fig. 2 is a fragmentary side elevation of the lower left hand corner of said front panel.

Fig. 3 is a sectional elevation taken along the line 4—4 of Fig. 1 and showing a hinge construction of the so-called conventional type not embodying the principles of the present invention.

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This view shows the hinged edge of the door slightly separated from the panel to illustrate the deficiencies of said conventional construction.

Fig. 4 is a view similar to Fig. 3 but illustrates a hinge construction including the principles of one embodiment of the present invention and wherein the details of said embodiment serve to prevent separative movement between said hinged edge of the door and the front panel of the box in a direction normal to the planes of the panel and door when the door is closed.

Fig. 5 is a fragmentary sectional elevation of a further embodiment of the invention, the fragments of the pivotally connected members being illustrated in the positions they occupy when the cover is in closed position.

Fig. 6 is a view similar to Fig. 5 but showing the fragment of the cover in open position.

Fig. 7 is a plan view of another embodiment of the invention included in a hinge per se.

Fig. 8 is a sectional elevation taken on the line 8—8 of Fig. 7.

Fig. 9 is a plan view of a still further embodiment of the invention included in a hinge per se.

Fig. 10 is a sectional view taken on the line 10—10 of Fig. 9.

Fig. 11 is a plan view of still another embodiment of the invention included in a hinge per se.

Fig. 12 is a sectional view taken on the line 12—12 of Fig. 11.

Switch boxes are usually provided on their front panels with a door or cover pivotally connected to the panel to permit access to the contents of the box. In some constructions, said door may even be provided with a smaller auxiliary door pivotally connected thereto and covering a small opening formed in the first door, said opening being for example for the purpose of permitting access to the fuses contained within the box.

The means for pivotally connecting doors of this nature to each other or to the panel of the box usually comprise inexpensive constructions such as a bail-like member having one leg passing through a slot in the cover, both legs of said member respectively passing through a pair of spaced openings formed in the panel or main door such as is illustrated in Fig. 3. The free ends of the bail-like member are narrower than the bent portion thereof in order that shoulders will be provided to engage the front face of the panel and properly locate the bent portion of the bail with respect to said panel or main door. The free ends of the bail-like member are then respectively bent at right angles in opposite directions

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to secure the member in operative position. Hinge means of this nature are thus readily and inexpensively fabricated.

One undesirable feature of this type of hinge construction resides in the fact that the apertures or slots in the door through which one leg of the bail-like member passes must be spaced inward from the pivoted edge of the door a certain distance to provide a strut of adequate strength between the edge of the door and said aperture or slot. When the door is pivotally moved to open position about a portion of said bail-like member, the bent portion of said member must be offset or spaced sufficiently from the panel or main door by which it is supported to provide adequate space in which the strut on the pivoted door may move.

The spacing between the bent portion of said U-shaped member and said panel or main door results in a failure to maintain the pivoted edge of the door in close relationship with the panel or door to which it is connected when said pivoted door is in closed position. Should an explosion occur within the box from any of a number of causes, the hinge structure described above will permit the hinged edge of the door to move away from the panel in a direction normal thereto and provide a space through which either flame or gases may pass, thus resulting in a hazard. A space of the nature referred to is illustrated in Fig. 3.

The present invention has been illustrated in the drawings in a number of different embodiments but the same basic principle is present in all of them. While said basic principle of the invention is illustrated as being particularly useful for pivotally securing switch box doors to each other or to a panel on a switch box, it is to be understood that the invention may be readily embodied in hinges per se which may be used for other purposes than those just described. Hinges per se are illustrated, for example, in Figs. 7 through 12.

The various embodiments of the present invention which are illustrated in the drawings are all susceptible of inexpensive manufacturing and may be fabricated at least as inexpensively as the present conventional hinge construction illustrated in Fig. 3. Thus, without sacrificing any virtues of the conventional construction, the present invention additionally provides simple but effective means for preventing relative movement between the pivotally movable components in a direction normal to the planes of said pivotally connected members when the same are in substantially parallel relationship and such as when a door which is pivotally supported by said hinge construction is in closed position relatively to a panel to which it is pivoted.

Referring to the drawings, Fig. 1 illustrates a front panel 10 of a switch box or casing to which a door 12 is pivotally secured by a plurality of hinge constructions embodying the present invention. The panel 10 may also be termed a base member.

Each of said hinge constructions comprises a bail or bail-like member 14, the free ends 16 of which are narrower in width than the bent portion of the bail 14. Said ends of the bails 14 are narrowed for a distance equaling approximately half of the length of the legs of said bails 14.

The front panel 10 is provided with a plurality of pairs of spaced slots or apertures 18 through which the free ends of the bail 14 are passed,

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the length of the slots 18 being sufficient to only freely pass the free ends of the legs of the bail which are reduced in width. The shoulders which are formed on the legs of the bail by reducing the width of the outer free ends thereof will abut against the front face of the panel to maintain the bail relatively thereto in the position shown in Figs. 3 through 6.

The pivoted edge of the door 12 is provided with a pair of spaced slot-like apertures 20 which respectively freely accommodate the wider bent portion of one of the bails 14. The door 12 is secured to the panel by passing one leg of the bail 14 through one of the apertures 20 and then passing the free ends of the bail through the slots 18 until the aforementioned shoulders on the bail abut the front face of the panel 10. The free ends of the bail are then respectively bent at right angles away from each other as illustrated in Figs. 3 through 6. The hinge is thus fabricated and the door is pivotally secured to the panel. The construction just described and illustrated is conventional.

In said conventional construction it will be observed that the struts 22 which are respectively between the pivoted edge of the door and the apertures 20 are of appreciable width in order to provide adequate strength inasmuch as said struts function somewhat as the pintle of a conventional hinge. The width of said struts requires adequate space between the bent portion of the bail 14 and the panel 10 to permit free movement of said strut therein when moving the door to open position.

The space between the bent portion of the bail and the panel normally produces a loose fit between the pivoted edge of the door and the panel so that, when the panel is in the closed position illustrated in Figs. 3 and 4, said pivoted edge of the door may move a small distance relatively to said panel in a direction normal thereto. Should an explosion occur within the box or casing from any cause, the pivoted edge of the door 12 may thus be blown away from the panel 10 as described, thus resulting in a space 24 illustrated in Fig. 3. Gases escaping through said space will result in a hazard to the exterior surroundings of the box.

One embodiment of the present invention is illustrated in Figs. 1, 2 and 4. Said embodiment comprises a door pivotally connected to a panel preferably by a pair of bails 14' which are provided with bendable ends 16 and are similar to bail 14 in all respects except that a tongue or lug 26 has been struck inward from one side of the bent portion of the bail as is clearly illustrated in Figs. 1, 2 and 4. Said tongue has a width less than the bent portion of the bail and, when the door 12 is in closed position with respect to the panel 10, the free end of the tongue 26 is in a position to directly engage a portion of the front face of the pivoted side or edge of the door 12 as is clearly shown in Fig. 4.

The tongue 26 will not interfere with the opening of the door 12 and, when the door is being moved from open to closed position, the curved portion of the bail will tend to cam the pivoted edge of the door beneath the tongue 26 so that said edge will be in operative position beneath the free end of said tongue when the door is fully closed.

Another embodiment of the invention is illustrated in Figs. 5 and 6 and in this embodiment the bail 14 is of the same construction as shown in Fig. 3 except that relative movement between

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the panel and the pivoted edge of the cover when in closed position is prevented by means of a curved projection 28 which is constructed to engage the inner surface of the curved end of the bail as illustrated in Fig. 5. As viewed in Fig. 5, said projection is upstanding with respect to the plane of the door. The curved configuration of said projection permits ready pivotal movement of the cover with respect to the panel as shown in Fig. 6.

A third embodiment of the invention is shown in Figs. 7 and 8 and is exemplified in a hinge per se. It is to be understood that the principles of this embodiment of the invention may, with equal facility, be utilized directly in a door or cover and panel of the nature previously described. In said third embodiment, a base member or leaf 30 is provided with a tongue 32 preferably having a width less than that of the base 30 and turned backward upon said base as illustrated in Fig. 8. A pivoted leaf 34 is provided with a slot 36 adjacent one edge 38, the slot receiving the tongue 32. Said edge 38 is turned upward as shown in Fig. 8 and is adapted to function as the tongue 28 and engage the inner curved surface of the loop or bail-like formation into which the tongue 32 has been bent.

The edge 38 will thus prevent relative separative movement in a direction normal to the planes of the base 30 and pivoted leaf 34 when the same are disposed in substantially parallel relationship as illustrated in Fig. 8. This position is that in which said base and pivoted leaf will be disposed when a member such as a door is secured to the pivoted leaf 34 and is in closed position. The cross-sectional configuration of the edge 38, as illustrated in Fig. 8, will permit ready pivotal movement between said base 30 and the pivoted leaf 34. Said base and leaf are respectively provided with suitable openings 40 for receiving screws and nails or other attaching means.

A fourth embodiment of the invention is illustrated in Figs. 9 and 10 and comprises a base member or leaf 42 provided with an integral tongue 44 having a width narrower than said base. A pivoted leaf 46 is provided with a slot 48 receiving said tongue 44. The tongue 44 is bent to assume a cross-sectional bail-like configuration similar to the tongue 32 shown in Fig. 8. However, tongue 44 differs in that it is provided with a projection or lug 50 which is narrower than the tongue and is struck inward therefrom as shown in Fig. 10 for purposes of cooperating with the upper surface of the pivoted edge of the leaf 46 to prevent relative separative movement between the base 42 and leaf 46 in a direction normal to the same when they are disposed in substantially parallel relationship, as shown in Fig. 10. The curved configuration of the tongue 44 will function similarly to the bail 14 shown in Fig. 4 to cam the free edge of the leaf 46 in a position to be beneath the free end of projection 50 when the leaf 46 is pivotally moved from so-called open position to the so-called closed position illustrated in Fig. 10. Apertures 51 are also provided in each leaf for receiving suitable attaching screws or nails.

A fifth embodiment of the invention is illustrated in Figs. 11 and 12, said embodiment being similar to the immediately preceding embodiment except that the base member or leaf 52 is provided with a tongue 54 having no projection struck therefrom but the free end of the tongue is curved to assume a position in which said free end will function in a capacity similar to the

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tongue 50 of the embodiment shown in Fig. 10.

Thus, the free end of tongue 54 comprises a projection in itself which is adapted to engage or substantially engage the upper surface of the inner edge of pivoted leaf 56 to prevent relative separative movement between the base 52 and leaf 56 in a direction normal to the planes thereof when said base and leaf are in substantial parallelism as illustrated in Fig. 12. Leaf 56 is provided with a slot 58 which receives tongue 54. The space 62 between the free end of tongue 54 and leaf 52 is also suitable to permit passage of the strut 64 when leaf 56 is turned onto leaf 52, whereby the leaves may be separated. Should separation of the leaves not be desired, the end of tongue 54 may be moved sufficiently close to leaf 52 to barely receive strut 64 thereunder but not permit complete passage of said strut thereunder.

The position of the leaves shown in Fig. 12 represents the so-called closed position of the hinge and leaf 56 may be pivotally moved with respect to the base 52 about a portion of the tongue 54 to a so-called open position. When the leaf 56 is moved from said open position to the closed position illustrated in Fig. 12, the curvature of tongue 54 is such that the inner end of leaf 56 will be cammed to proper position beneath the inner free end of said tongue when the leaf 56 reaches the position shown in Fig. 12. As in the preceding two embodiments, the base 52 and leaf 56 are provided with suitable apertures 60 which receive suitable attaching means such as screws or nails.

The unhinged edge of the cover or door 12 may be latched in closed position by any suitable latching means which may be controlled, if desired, by a manually engageable handle 66. The latching means controlled by the handle 66 and the hinge means including one of the embodiments of the present invention will serve to maintain the door 12 in closed position with respect to the panel 16 and substantially completely seal the edges of the door with respect to the panel to prevent the escape of gas and particularly flame from the interior of the box to which the panel 16 is secured.

If the latching means controlled by the handle 66 are such that they embody positive latching as distinguished from a snap acting function, said latching means will cooperate with the hinging means including one of the embodiments of the invention to prevent the escape of flame from a cabinet with which said means are used except perhaps under conditions where an explosion within the box developed exceptionally high pressures.

It will thus be seen that the various embodiments of the present invention may be incorporated in pivotally connected members which may respectively comprise portions of a box and door or leaves of a hinge per se. Furthermore, said embodiments readily lend themselves to being fabricated from inexpensive material such as sheet metal. No pivot pins are required in connecting the members for relative pivotal movement and yet the hinge construction comprising the various embodiments of the present hinge invention results in relatively precise positioning of a door with respect to a panel or box when the door is in closed position, whereby no separative movement may take place in a direction normal to the plane of the door when said door is in closed position with respect to the panel or box to which it is pivotally attached.

While the invention has been illustrated and

described in its preferred embodiment and has included certain details, it should be understood that the invention is not to be limited to the precise details herein illustrated and described since the same may be carried out in other ways, falling within the scope of the invention as claimed.

What I claim is:

1. In a hinge construction, the combination of a base, a sheet-like leaf having an aperture adjacent one edge, a connecting member carried by said base and passing through said aperture transversely of the plane of said leaf to connect said leaf and base for relative pivotal movement, said connecting member having a curved portion offset normally from said base a distance substantially greater than the thickness of said leaf, and flexible means struck up from and carried by said connecting member and positioned to substantially engage an edge portion of said leaf adjacent said aperture when said portion is in a plane approximately parallel to the plane of said base and is contiguous to said base to prevent appreciable separative movement of said leaf and base in a direction normal to the plane of said leaf, said portion of said leaf being movable out of said engagement with said means upon relative pivotal movement of said base and said leaf.

2. A panel provided with an opening and a door constructed to cover said opening and provided with a slot parallel to and adjacent one

edge of said door, in combination with a bail secured to said panel and having one leg passing through said slot of said door transversely of said door to pivotally secure said door to said panel for movement between open and closed positions, the curved portion of said bail extending away from said panel a distance greater than the thickness of said door to permit free pivotal movement of said door with respect to said panel, and a flexible lug struck inward from one leg of said bail and having its free end positioned to substantially engage said door when said door is in closed position on said panel and thereby prevent separative movement between said door and panel in a direction normal to the plane of said panel, said door being movable out of said engagement with said lug upon movement of said door to said open position thereof.

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