

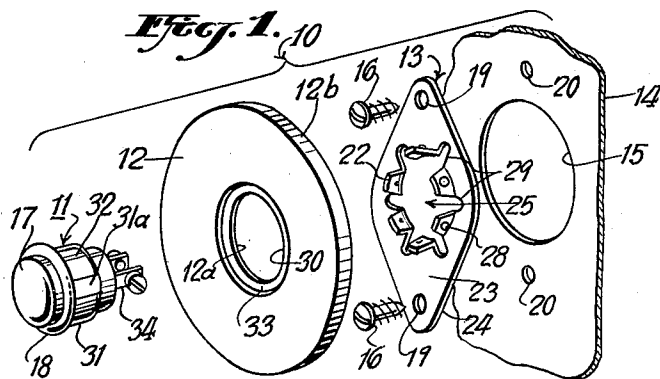
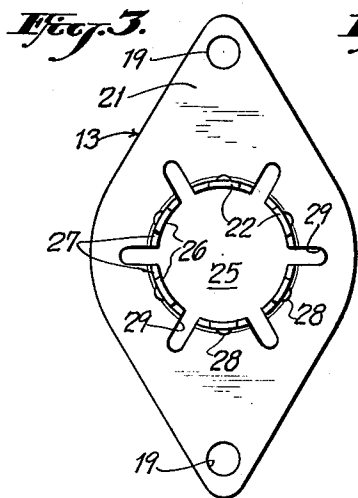
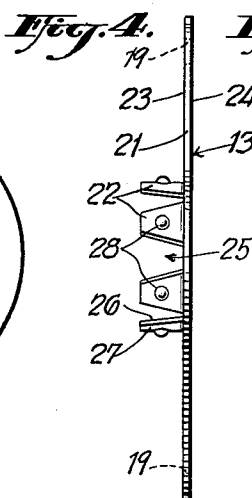
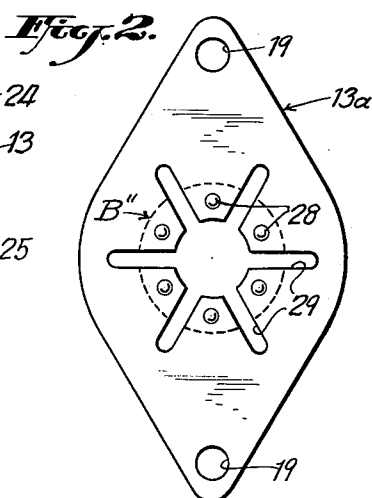
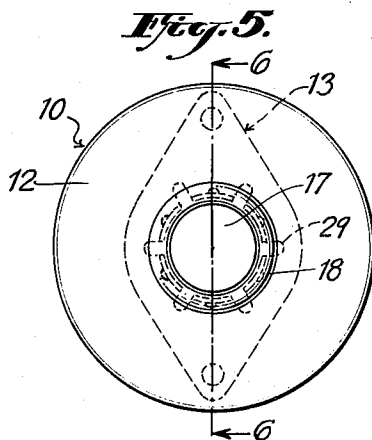
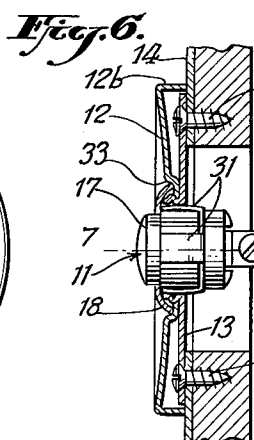
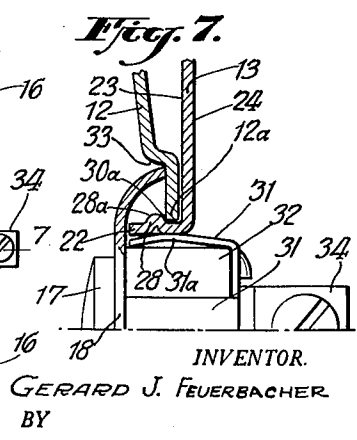
April 9, 1963

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3,084,962

FASTENER MEANS

Filed April 6, 1960



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3,084,962

FASTENER MEANS

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Filed Apr. 6, 1960, Ser. No. 20,335

5 Claims. (Cl. 287-20)

This invention relates to fastener means of the self-locking type. More particularly, the invention relates to a novel adapter used in combination with other fastener elements for releasably securing a push-button switch unit or the like to a surrounding connection plate, such as may be used for decorative purposes, and for releasably securing both the push-button unit and connection plate to a door frame or similar support, usually over an aperture therein.

As assembled ready for installation to operate a door bell, for example, the push-button and its spring, wire terminals and other parts are contained in a small, cylindrical housing so as to form a unit to be inserted into a wire junction aperture of a door frame. In homes and other decorative buildings, it is desirable to mount the push button assembly unit together with a surrounding decorative plate without leaving exposed screw heads or similar attachment means, and in a manner so that the two are firmly secured to the door frame. They should be held tightly in place so that the decorative plate will not tend to rotate about the cylindrical unit during normal use of the button. Furthermore, attachment and removal of both the push button unit and the decorative plate, themselves, should not involve the use of screws or similar semi-permanent fastener means, and should be quite easily effected.

Generally describing the invention, its objects are achieved in a preferred embodiment by providing a novel adapter of relatively rigid construction, which may be semi-permanently attached as by screws or the like to an apertured door frame or other apertured support, and which has an aperture-defining series of outwardly extending prongs. The aperture so formed corresponds in size and shape to that of the push button unit for receiving the same. Each prong is center-punched at a location along its length on its aperture-defining surface to provide a small, button-like protrusion on its opposite surface, so that, effectively, a circular band of such protrusions is provided by their appearance on the outer surfaces of the extending prongs. Further, the flat plate portion of the adapter is slotted in outward radial direction between each of the prongs from the push-button aperture, the slots imparting resiliency to the relatively rigid prongs for spreading movement thereof when engaged by the push-button insert member. The referred to protrusion on each prong is spaced away from the flat surface of the adapter plate, along the length of the prong, a distance which corresponds to the thickness of a connection plate such as might be used for decorative purposes. The connection or decorative plate has an aperture therein corresponding in size and shape to the outer effectively cylindrical surface formed by the extending prongs for snap engagement over the band of button-like protrusions and against the flat surface of the adapter, the entire thickness of the decorative plate passing at least the high points of the protrusions. The decorative plate has a surrounding, inwardly turned edge portion to engage the door frame, when the fastener means are installed, to effect a slight bias on the decorative plate in direction outward from the door frame to insure pressure engagement of the adapter button-like protrusions against the peripheral edge of the decorative plate aperture. The push-button unit is of the conven-

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tional snap-in type, having several longitudinally extending flat springs disposed about its body portion, and is inserted into the aperture formed by the series of adapter prongs from the same side of the adapter as was the decorative plate. Upon insertion of the push-button unit, it will be found that the push-button and its surrounding decorative plate are firmly secured together. It will also be found that both can be removed from the adapter plate easily, but not too readily, by "prying" the push button outwardly from between the prongs, and thereafter removing the decorative plate.

These and other objects and features of the invention will become more fully apparent from the following detailed description thereof when taken together with the accompanying drawings in which:

FIGURE 1 is an "exploded" assembly view of a push-button fastener embodying the invention;

FIGURE 2 is a front view of a punched blank for making a novel adapter for use in practicing the invention;

FIGURE 3 is a front view of the novel adapter as fully formed;

FIGURE 4 is a side view of the formed adapter shown in FIGURE 3;

FIGURE 5 is a front view of the push-button fastener assembly of FIGURE 1 when in assembled condition;

FIGURE 6 is a sectionalized side view of the assembled push-button fastener, the section taken at lines 6-6 of FIGURE 5; and

FIGURE 7 is an enlarged view in cross-section of a portion of FIGURE 6, as indicated at 7-7 therein, to show the details of the junction between the parts.

In the embodiment of the invention shown by FIGURES 1 and 5-7, fastener means 10 constructed in accordance with the invention has an insert member, such as a push-button unit 11, a connection plate 12, which may be a decorative plate, and an adapter 13.

The connection plate 12 itself provides support for adapter 13 and an insert member 11. However, the adapter 13 may be attached to an exterior support 14, such as a door frame or electrical junction box, over an aperture 15 therein. Any suitable attachment means such as screws 16 may be used. When the adapter is so attached, the connection plate may serve as a decorative plate surrounding a push-button as finally assembled. Thus, a push-button unit 11 and decorative plate 12 may be firmly, but releasably secured to a door frame, as will be described. The door frame support, of course, may be made of wood, or metal, or any conventional material. In fastened condition as shown by FIGURES 5 and 6, the push-button 17, itself, and the peripheral trim or flange portion 18 of the push-button unit 11 will lie generally flush with the surrounding surface of the plate 12 with the inwardly turned edge portion 12b of the latter positioned against the exterior surface of the support 14.

Describing the novel adapter 13 of the invention in detail, and referring to FIGURES 3 and 4, the adapter 13 as finally formed has a peripheral plate portion 21 which is generally flat so as to lie flush with a door frame support such as is indicated by numeral 14 in FIGURES 1 and 6. The adapter 13 also has a plurality of resilient prongs 22 extending perpendicularly outward of the surface 23 of the peripheral plate portion so as to define an aperture of the adapter, as generally indicated by numeral 25, for receiving the push-button unit 11. Each prong 22, therefore, has an aperture-defining surface 26. On the outer surface 27 of each prong, which is the reverse side thereof with reference to the aperture-defining side, there is formed a small prong protrusion 28 preferably having button like shape.

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The protrusion 28 is located along the length of each prong, being spaced away from the surface 23 a distance corresponding to the thickness 12a of the decorative plate 12 for a purpose to be described.

The adapter 13 is preferably made of steel or the like so as to be relatively rigid, and it is preferred that the adapter have unitary construction so that the prongs 22 are also relatively rigid. However, the prongs 22 must be resilient, as will be seen, and to impart resiliency to the relatively rigid prongs when the adapter is so formed, the flat peripheral plate portion 21 of the adapter has slots 29 formed therein between each of the prongs 22 which extend radially outward from aperture 25 in the manner clearly shown by FIGURES 2 and 3.

When the adapter 13 is integrally formed, simple punching operations are performed on a flat piece of steel to provide a blank 13a as shown in FIGURE 2. Thus, a flat plate generally having shape as shown may be punched to have a central aperture pattern which includes the slots 29. While the plate is still in flattened condition, protrusions 28 may be easily formed by center punching from the opposite side of the extending tab portions 22a between the slots 29. For example, where six tabs 22a are formed, six center punches may be arranged in a circular pattern having the appropriate diameter so that all of the protrusions 28 may be formed simultaneously in the flat adapter blank. After center punching, the tabs 22a of the adapter blank are accurately die-pressed so as to be bent, as along indicated line "B," into perpendicularly extending relation with respect to the surface 23 of the flat plate portion 21 of the adapter. The adapter will have final form as shown by FIGURES 3 and 4.

Adapter peripheral plate portion 21 may be adapted for attachment to the support 14, by providing screw holes 19 therein. Thus, as apparent from the drawings, when attached to an apertured support 14, the surface 24, opposite the surface 23 from which prongs 22 extend, will lie flush with the surface of the support 14. Attachment is made as by screws 16 passing through the holes 19 of the adapter, which may be countersunk, and thence through holes 20 of the support.

Adapter 13 affords simple connection between the insert member 11 and the connection plate 12, the adapter 13 being interposed between the two. The plate 12 has an aperture 30 formed therein which dimensionally conforms with the outer effectively cylindrical surface formed by the surfaces 27 of the extending prongs 22. Moreover, the aperture 30 should be smaller in diameter than the effective circle formed by the top extremities of the protrusions 28. Thus, the plate 12 may be snapped into place against flat plate portion 21 of the adapter over the prongs 22, the resiliency of the prongs permitting the plate aperture 30 to pass over the protrusions 28 of the prongs.

As more readily seen from FIGURE 7, the distance at which the protrusions 28 are located away from the surface 23 of the adapter is such as will correspond with the thickness 12a of the connection plate 12 so that protrusions 28 will provide pressure engagement of the plate with the adapter. When assembled, the central, or high point 28a of each protrusion of the adapter should lie just in front of the outer edge portion 30a of the plate aperture 30 so that the innermost sloping side of each protrusion 28 will provide a pressure component against edge portion 30a both radially outward and towards adapter surface 23. Thus, adapter 13 and plate 12 are in pressure engagement with each other due to the resiliency of the adapter prongs 22.

The insert member 11 of the fastening means 10, such as a push-button unit, has bias means 31 disposed about the surface of its insert body portion 32 which provides outward bias when the member or article is inserted between prongs 22. In the conventional push-button unit,

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the bias means usually consists of a plurality of longitudinally extending flat springs 31 disposed about the body portion 32 of the push-button unit, as shown by the drawings. These springs are bent slightly as at 31a at uniform locations along their lengths to provide their outward bias. The inner peripheral surface of the adapter aperture 25, which surface is effectively formed by aperture-defining prong surfaces 26, dimensionally corresponds with the insert body portion 32 of member 11 so that when inserted into the aperture 25, from the same direction as was the connection plate 12, the outward bias of the bias means 31 will provide pressure engagement of the insert article between the adapter prongs.

It will be found that when the fastener 10 is assembled, the adapter 13 provides a relatively tight fit between the inserted member 11 and the connection plate 12, yet the fastener 10 may be disassembled easily, but not readily, by "popping" apart, or prying out the insert member from between the adapter prongs 22, and thereafter "popping" apart, or disengaging the connection plate and the adapter.

Where connection plate 12 is intended to serve as a decorative plate surrounding a push-button, the peripheral trim, or flange portion 18 of the push-button unit is curved as shown to provide a generally flush appearance with the outer surface of the decorative plate when the fastener 10 is assembled. The decorative plate 12 may be slightly recessed as at 33, FIGURES 1 and 6, to add to the flush-like appearance.

When the adapter 13 of a push-button fastener means 10 is attached to a support 14, such as by screws 16, the decorative plate 12 is made large enough to cover the screws, and is provided with an inwardly turned edge portion 12b, as indicated in the drawings. Referring to FIGURE 6, the height of edge portion 12b away from the surface of support 14 is such as will cause a slight bias, or tendency of the decorative plate to spring away from the support 14 and out of snap-on engagement with the adapter prongs 22. This causes its aperture peripheral edge portion 30a always to exert outward pressure towards the innermost sloping sides of protrusions 28. Provision of such outward pressure tendency assures that the fastener means will function in the manner above described since reactively equivalent adapter engagement forces are promoted. Its utility is at least two-fold: it reduces the dimensional criticality of the distance with which protrusions 28 are spaced outwardly away from surface 23 of adapter 13; and it will promote corrective reactive forces between the parts such as will cause the decorative plate 12 to lie flush against support 14 at all points about its edge portion 12b when the installation is complete. As illustrative of the latter, if a spot of paint, or other unevenness on the surface of a door frame support 14 causes adapter 13 to be tilted slightly away from the frame 14 at one of its ends, the referred to outwardly biasing pressure of the decorative plate will tend to cause those prongs 22 at the opposite end of the adapter to bend inwardly towards the center of the adapter aperture 25. When push-button unit 11 is inserted in aperture 25, the prongs 22 on the other side thereof will bend radially outward a slightly greater amount than they would under ordinary conditions so as to cause greater pressure on that side of the decorative plate aperture periphery to force that side of the plate against the door frame 14. The otherwise undue appearance of the installation by reason of the stated difficulty is thereby corrected.

Thus, the push-button unit 11 may be secured to an apertured support 14, such as a door frame, in a manner to facilitate its easy removal for replacing the same, or repairing the attachment of electric wires (not shown) to wire terminals 34 thereof, or for other purposes. Although the push-button unit may be easily removed, the fastener means provided by the invention assures a sufficiently tight engagement of the push-button unit with the apertured support so that it may not be readily re-

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moved. In like manner, the decorative plate 12 is held in tight engagement so that it may be neither readily rotated about the push button unit nor readily removed. However, by first removing the push-button unit, the decorative plate may also be easily removed from the adapter 13 for cleaning, painting of the door frame, and similar purposes.

In the embodiment of the invention shown, aperture 25 formed by the prongs of the adapter is circular in shape as is aperture 30 of the plate 12. In such embodiment, it is preferred that about six prongs 22 be provided on the adapter 13, although a lesser number may be adequate. However, it is apparent that the insert body portion of the push-button unit or similar article may have other shape, such as rectangular, and that by providing an adequate number of appropriately located prongs all of the objects of the invention may be achieved.

What is claimed is:

1. Fastener means comprising an insert member including a body portion having outward bias means disposed therearound, an adapter having a base portion and a plurality of substantially rigid prongs extending perpendicularly outward from a surface of said base portion to define an insert passage receiving said insert body portion in bias pressure engagement between said prongs, said base portion slotted between each of said prongs in radial direction with respect to said defined passage, and connection means disposed about and engaging said adapter prongs, each of said prongs having a slight protrusion on the reverse side of its passage-defining surface at a location along its length away from said base portion surface substantially equal to the thickness of said connection means and engaging the connection means to exert engagement pressure thereon in radial outward direction and in direction toward said base portion surface.

2. Fastener means according to claim 1, wherein said insert member is a push-button unit, and said connection means is a push-button surrounding decorative plate.

3. Fastener means for releasably securing an outwardly biased insert article to a support comprising an adapter having a base portion and a plurality of resilient prongs extending perpendicularly outward from a surface of said base portion to define an insert passage adapted to receive such insert article, said base portion adapted for attachment at the opposite surface thereof to the support,

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and a connection plate disposed about and engaging said adapter prongs, each of said prongs having a slight protrusion on the reverse side of its passage-defining surface at a location along its length away from said base portion surface a distance substantially equal to the thickness of said connection plate, and the outwardly projecting extreme end of each said prong being straight, said connection plate engaging said prongs in snap-on locking relation substantially between said prong protrusions and said base portion surface.

4. A push-button installation on a support comprising an adapter having a base portion attached to the support, said adapter having a plurality of substantially rigid prongs extending perpendicularly outward of the support from a surface of said base portion to define an insert passage, said base portion slotted between each of said prongs in radial direction with respect to said defined passage, a push button unit having outwardly extending bias means disposed therearound, said push button unit inserted within said defined passage in bias pressure engagement between said adapter prongs, and a connection plate disposed about and engaging said adapter prongs, each of said prongs having a slight protrusion on the reverse side of its passage-defining surface at a location along its length away from said base portion surface substantially equal to the thickness of said connection plate, said connection plate engaging said prongs in snap-on locking relation substantially between said prong protrusions and said base portion surface.

5. A push-button installation on a support according to claim 4, wherein said connection plate has a peripheral flange in radially outward spaced relation to said prongs and to said adapter base portion, said flange projecting toward, and into pressure engaging contact with the support.

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