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04-CV-01268-CMP

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MAY 21 2004 MR  
AT SEATTLE  
CLERK U.S. DISTRICT COURT  
WESTERN DISTRICT OF WASHINGTON  
DEPUTY

UNITED STATES DISTRICT COURT  
WESTERN DISTRICT OF WASHINGTON AT SEATTLE

COREY T. KING, an individual, d/b/a KING  
ENTERPRISES,

Plaintiff,

v.

GREG G. GOOD, an individual,

Defendant.

No. **CV04-1268**  
COMPLAINT  
JURY TRIAL DEMANDED

Plaintiff Corey T. King doing business as King Enterprises ("King") for its complaint against Defendant Greg G. Good ("Good") states and alleges as follows:

**JURISDICTION AND VENUE**

1. This is an action for a declaratory judgment under 28 U.S.C. § 2201. King seeks a declaratory judgment that United States Patent No. 5,229,545 ("the '545 Patent") is invalid and unenforceable and not infringed by King, either directly or as an inducing or contributory infringer. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331, 1338(a), 2201 and 2202. Venue is proper in this district under 28 U.S.C. § 1391(b).

**PARTIES**

2. Corey T. King is an individual doing business as King Enterprises having a principal office at 6921 164<sup>th</sup> Street SE, Snohomish, Washington 98296. King is licensed to and does carry on business activities within this district.

**ORIGINAL**

1 3. Upon information and belief, Good is an individual residing in Mill Creek,  
2 Washington, and is the owner of all right, title and interest in the '545 Patent.

3 4. There is a case of actual controversy between King and Good concerning  
4 infringement of the '545 Patent in that Good, through his counsel, has accused King of  
5 infringing at least one claim of the '545 Patent.

#### 6 FACTUAL BACKGROUND

7 5. King promotes, markets, offers for sale and sells goods in the field of switch  
8 assemblies, including, *inter alia*, a two button or "two finger type" switch assembly.

9 6. Upon information and belief, the '545 Patent, entitled "SWITCH HOLDER FOR  
10 ALARM SYSTEMS," issued to Good on July 20, 1993, and is based upon an application filed  
11 on September 30, 1992. A copy of the '545 Patent as originally issued by the United States  
12 Patent and Trademark Office ("USPTO") is attached as Exhibit A.

13 7. On February 6, 2002, Good, through his counsel, Robert A. Jensen, sent Mr. Corey  
14 King, a King representative, correspondence alleging that, "you are having made the switch  
15 holder that infringes at least Claim 1 of U.S. Patent No. 5,229, 545, which is owned by my  
16 client." *See* February 6, 2002 letter attached as Exhibit B.

17 8. On May 13, 2004, Good, through his counsel, Robert A. Jensen, sent Mr. Corey  
18 King, a King representative, correspondence alleging that Mr. King has made available over  
19 the internet a switch assembly similar to, if not identical to, the product indicated in the  
20 February 6, 2002, letter, that infringes at least Claim 1 of the '545 Patent. *See* May 13, 2004,  
21 letter attached as Exhibit C.

22 9. As a result of the aforementioned letters and based on the threats made therein,  
23 King has a reasonable fear and apprehension that Good will commence an action for patent  
24 infringement against it in the United States. An actual and justiciable controversy therefore  
25 exists between the parties.  
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**PATENT INVALIDITY**

1  
2 10. Plaintiff realleges each and every allegation set forth in paragraphs 1 through 9  
3 above as though fully set forth herein.

4 11. Some or all of the claims of the '545 Patent are invalid for failure to comply with  
5 the requirements of Part II of Title 35, U.S.C.

6 12. Ronald W. Myers filed a U.S. patent application, entitled "Circuit Board Housing  
7 Having Self-Contained Modular Jack," on March 28, 1983, which issued as U.S. Patent  
8 No. 4,497,526 on February 5, 1985 ("the '526 Patent"). The '526 Patent issued more than one  
9 year prior to the filing date of the application that matured into the "545 Patent. A copy of  
10 the '526 Patent is attached as Exhibit D.

11 13. Lynn W. Abernethy and Elvert S. Watts filed a U.S. patent application, entitled  
12 "Jack," on April 20, 1979, which issued as U.S. Patent No. 4,202,593 on May 13, 1980  
13 ("the '593 Patent"). The '593 Patent issued more than one year prior to the filing date of the  
14 application that matured into the "545 Patent. A copy of the '593 Patent is attached as Exhibit  
15 E.

16 14. Upon information and belief, a phone jack developed by UltraTech Power  
17 Products was sold as model no. 1M-RJ31XSET 01.11 in the United States more than one year  
18 prior to the filing date of the application that matured into the '545 Patent.

19 15. Upon information and belief, a two button switch assembly developed by  
20 Diebold, Incorporated ("Diebold") was sold as model no. 19-012080-0-00A in the United  
21 States more than one year prior to the filing date of the application that matured into the  
22 '545 Patent.

23 16. Upon information and belief, Good was employed at Diebold prior to the filing  
24 date of the '545 Patent. By and after employment at Diebold, Good sold a switch assembly,  
25 which was material to the patentability of the '545 Patent, in the United States more than one  
26 year prior to the filing date of the application that matured into the '545 Patent.  
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1 17. Some or all of the claims of the '545 Patent are directly anticipated or otherwise  
2 rendered obvious by the one or more of the material prior art described in paragraphs 12-16.  
3 The material prior art described in paragraphs 12-16 was never cited to or considered by the  
4 United States patent examiner during the prosecution of the application that matured into  
5 the '545 Patent.

6 18. Upon information and belief, Good never disclosed the existence of the material  
7 prior art described in paragraphs 12-16 to the patent examiner during the examination process  
8 of the '545 Patent.

9 19. Accordingly, the '545 Patent is invalid and void, because the alleged invention  
10 was described in a printed publication and/or in use or on sale in the United States more than  
11 one year prior to the filing date of the application for the '545 Patent in the United States, in  
12 violation of 35 U.S.C. § 102. Alternatively, some or all of the claims of the '545 Patent are  
13 invalid as being obvious within the meaning of 35 U.S.C. § 103 over the material prior art  
14 described in paragraphs 12-16.

15 **INEQUITABLE CONDUCT**

16 20. King repeats and realleges each and every allegation of paragraphs 1 through 19  
17 as though fully set forth herein.

18 21. Upon information and belief, Good caused the application which matured into the  
19 '545 Patent to be filed with full knowledge that the subject matter of the application had  
20 previously been invented by another and was embodied in a product on sale in the United  
21 States more than one year prior to the July 20, 1993 filing date of the '545 Patent.

22 22. As previously stated, the aforementioned product sale described in paragraph 16  
23 and 21 constitute material prior art that should have been disclosed to the patent examiner.

24 23. Upon information and belief, Good never disclosed the existence of the  
25 aforementioned products sales to the patent examiner during the patent examination process.  
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1           24. In view of the foregoing, Good failed in his duty to disclose to the U.S. Patent  
2 and Trademark Office information of which he was aware that was material to the  
3 examination of the application that matured into the '545 Patent. The '545 Patent is, therefore,  
4 unenforceable due to Good's inequitable conduct during prosecution.

5                               **PATENT NON-INFRINGEMENT**

6           25. Plaintiff realleges each and every allegation set forth in paragraphs 1 through 24,  
7 as though fully set forth herein.

8           26. King's unique two button switch assembly contains significant differences from  
9 invention claimed in the '545 Patent. King has not directly infringed, induced the  
10 infringement of, nor has been a contributory infringer, of any valid claim of the '545 Patent.

11           27. Pursuant to 28 U.S.C. §§ 2201 and 1338(a), King is entitled to a judgment  
12 declaring that King does not infringe any valid claim of the '545 Patent.

13               WHEREFORE, plaintiff King prays that the Court enter judgment that:

14           A. U.S. Patent No. 5,229,545 is invalid, unenforceable and/or not infringed by  
15 plaintiff King, or any of its products;

16           B. Good and all of its officers, agents, employees, representatives and counsel,  
17 and all persons in active concert or participation with any of them, directly or indirectly, be  
18 enjoined from charging infringement or instituting any action for infringement of U.S. Patent  
19 No. 5,229,545 against King or any of its customers and contractors;

20           C. This is an exceptional case pursuant to 35 U.S.C. § 285. King therefore  
21 specifically requests its reasonable attorney's fees, expenses and costs in this action; and

22           D. King be awarded such other and further relief as the Court may deem just and  
23 proper.

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**PLAINTIFF DEMANDS TRIAL BY JURY.**

Plaintiff King hereby demands a trial by jury for all issues presented by this action.

Dated this 21<sup>st</sup> day of May, 2004.

Respectfully submitted,



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James W. Anable, WSBA No. 7,169  
Steven P. Fricke, WSBA No. 25,070  
John D. Denkenberger, WSBA No. 25,907  
Brandon C. Stallman, WSBA No. 31,303  
CHRISTENSEN O'CONNOR  
JOHNSON KINDNESS<sup>PLC</sup>  
1420 Fifth Avenue, Suite 2800  
Seattle, WA 98104  
Telephone: (206) 682-8100  
Facsimile: (206) 224- 0779  
E-Mail: john.denkenberg@cojk.com  
E-Mail: james.anable@cojk.com  
E-Mail: steven.fricke@cojk.com  
E-mail: brandon.stallman@cojk.com  
Attorneys for Plaintiff

# **EXHIBIT A**



US005229545A

**United States Patent** (19)  
**Good**

(11) **Patent Number:** 5,229,545  
 (45) **Date of Patent:** Jul. 20, 1993

- [54] **SWITCH HOLDER FOR ALARM SYSTEMS**
- [76] **Inventor:** Gregory C. Good, 14920 16th Ave. SE., Mill Creek, Wash. 98012
- [21] **Appl. No.:** 954,904
- [22] **Filed:** Sep. 30, 1992
- [51] **Int. Cl.:** H05K 5/00; H01H 13/04
- [52] **U.S. Cl.:** 174/52.1; 361/357; 200/293
- [58] **Field of Search:** 174/50, 52.1; 361/356, 361/357, 376, 390; 200/293, 293.1, 294, 295, 296, 297

5,128,828 7/1991 Mrenna et al. 361/346

**FOREIGN PATENT DOCUMENTS**

2201825 8/1990 Japan 200/293

*Primary Examiner—Leo P. Picard*  
*Assistant Examiner—Bot L. Ledyuh*

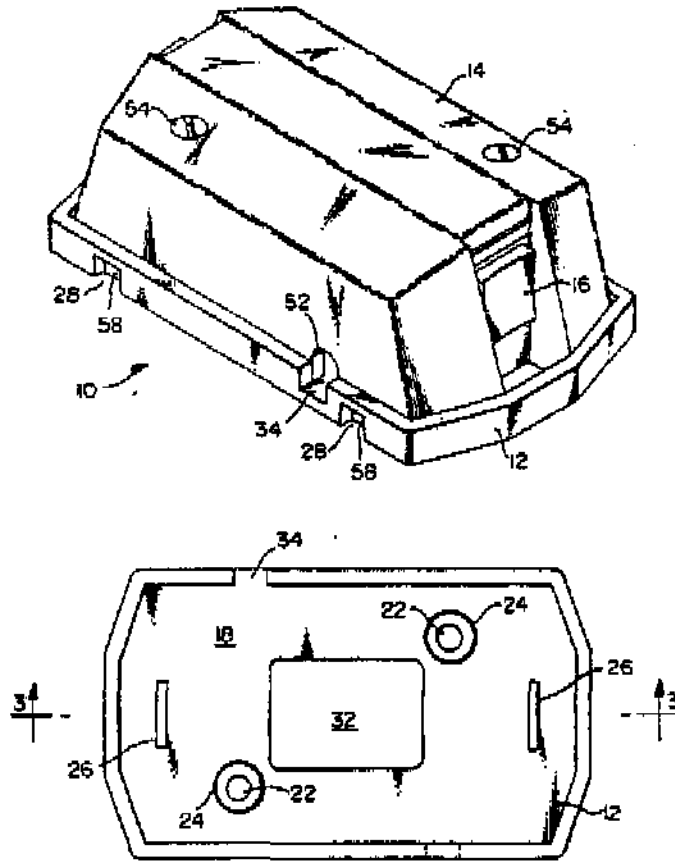
[57] **ABSTRACT**

A switch holder includes a cover which slidably receives a push-button type switch at opposite ends. The cover is adapted to provide a mounting for the switches such that the switches are conveniently slid into and out of the cover. A base is provided which includes a surface having a raised portion to aid in mounting the cover. The base also includes abutment members which contact the switch when the cover is mounted thereby positioning and steadying the switches within the cover. The cover has mounting tabs which engage small openings in the base in a flexure and snap in place type of connection. The cover may also be attached to the base by passing fasteners through holes in the cover which align with mounting holes in the base.

[56] **References Cited**  
**U.S. PATENT DOCUMENTS**

2,307,258	1/1943	De Smidt et al.	200/159
2,897,327	7/1959	De Smidt et al.	200/168
3,200,227	8/1965	Karch	200/293
3,433,408	7/1969	Mune	200/168
3,597,564	8/1971	Lewis	200/168
3,723,689	3/1973	Wenzel	200/166
3,953,699	4/1976	Scheibel et al.	200/293
4,051,665	10/1977	Arn	200/293
4,163,882	8/1979	Baslow	
4,977,300	12/1990	Schroeder	200/293

15 Claims, 2 Drawing Sheets





U.S. Patent

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FIG. 1

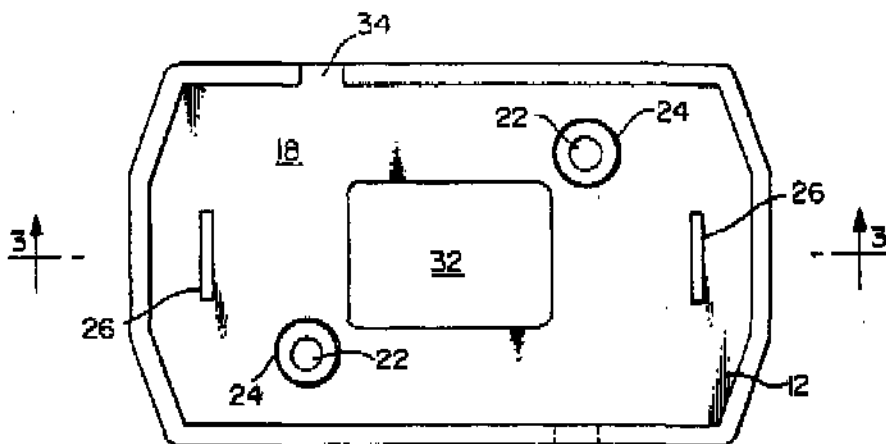
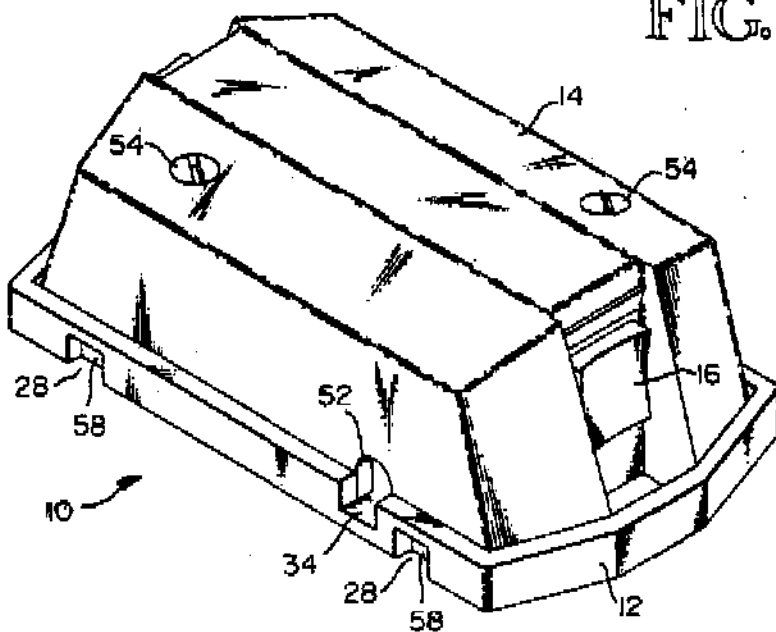
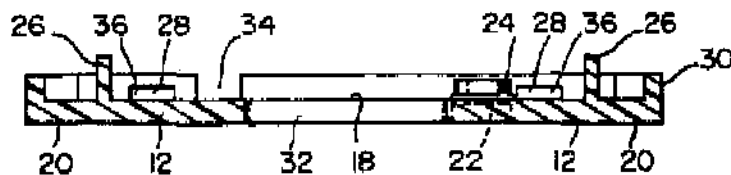


FIG. 2

FIG. 3



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FIG. 4

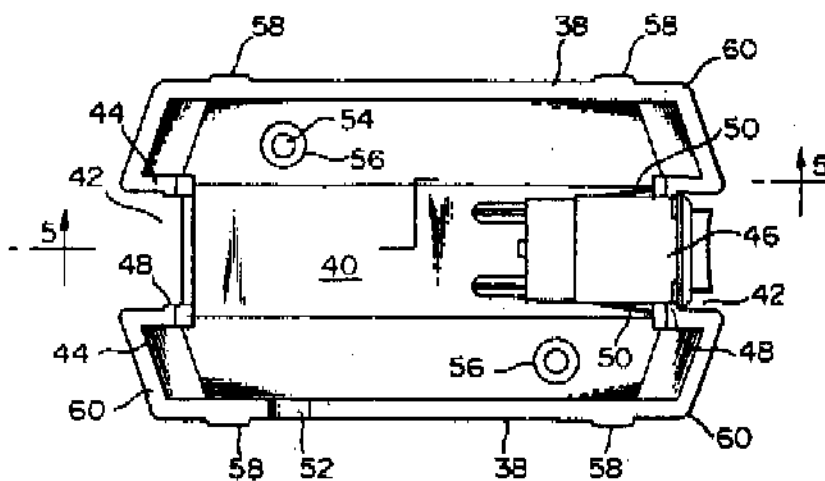


FIG. 5

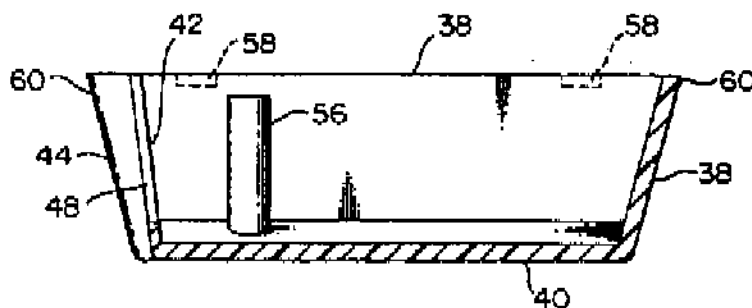
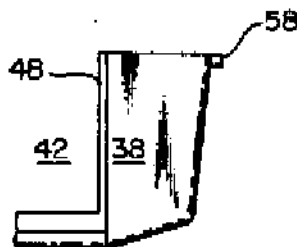


FIG. 6



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## SWITCH HOLDER FOR ALARM SYSTEMS

## DESCRIPTION

## 1. Technical Field

The present invention relates to alarm safety switches used to reduce the risk of an alarm being accidentally activated. More particularly, the invention relates to provision of a safety switch holder which is basically characterized by a pair of push button switches, each slidingly received at opposite ends of a cover which is in turn easily removable from a mounting base, allowing each switch to be rapidly wired and installed, repaired or interchanged with a new one.

## 2. Background of the Invention

In applications where reliability of a switch is of critical importance, ease of accessibility to quickly repair or replace the switch is desirable. The switches typically used to trigger a bank alarm system or turn on a camera e.g., at each teller station as well as other appropriate locations are an example of an application where replacement has to be made as quickly as possible. Generally speaking, the switches at the teller stations and elsewhere are always activated, i.e., they are always carrying an electrical current (active alarm system). If the current is interrupted, such as when a wire is cut or a switch fails, the alarm is activated. In the event that a switch fails and a false alarm is sounded, the entire alarm system is generally shut down until the faulty switch can be found and repaired or replaced. It is therefore desirable to have a switch holder which allows the switches to be repaired or replaced within a minimum amount of time.

The importance of providing a switch holder having the characteristics described above is that active alarm systems have an inherent problem. In an active alarm system, the contact points in switches have a tendency to oxidize more rapidly than if there was no current continuously flowing through them. This oxidation process is a leading cause of switch failure. Since switch life is very unpredictable, replacement of a failed switch is the most cost effective way to deal with the problem. It is known that the risk of false alarms can be reduced by using a pair of switches at each station. The pair of switches, which are usually of a push-button type, are placed diametrically opposite to each other within a single case or housing such that a person would normally have to use two digits to activate the alarm. In this manner, if one switch is accidentally pushed, the alarm will not sound. Further, since the switches are mounted out of sight, i.e. under a desk, it is appropriate that they be of as low profile and have a minimum of sharp edges or corners as possible.

## DISCLOSURE OF THE INVENTION

A switch holder for mounting a switch is disclosed which includes a base and a cover. The base has a generally planar mounting surface permitting the base to be mounted to an appropriate surface and further includes a cover receiving surface. The cover receiving surface has a cover mounting means receiving portion and a switch positioning abutment member. The abutment member extends outwardly from the cover receiving surface and is positioned so as to contact and position the switch within the cover when the cover is secured to the base member. As indicated, the cover has a switch receiving opening in each end which are generally rectangular in shape with an open lower end for

slidingly receiving the switch which is generally square in cross section. The cover includes a plurality of side panels and a top panel. The cover further includes a mounting means by which it is connected to the base.

Preferably, the pair of switch receiving openings in the cover which are diametrically opposed to each other. The position of the switches is a safety feature, since both switches must be pushed in order to trigger an alarm, it is more reliable if they are physically separated.

In the preferred form, the cover is connected to the base by means of a plurality of tabs which are flexibly mounted to the cover and engage a equal number of holes in a ridge formed at, and extending upwardly from, a peripheral portion of the base.

For mounting the switch, a plurality of holes may be provided in the cover which are aligned with a plurality of mounting holes in the base. To provide proper distribution of the mounting forces, a fastener tube is provided which extends from the cover mounting holes to the base mounting holes.

Alternatively, once the switches are mounted within their housing, the housing could be taped to the supporting surface using any one of the several commercially available double sided tapes.

An opening in the base is provided for introducing wires to the switches. Alternatively, an opening may be provided in the ridge portion of the base and an opening in the cover aligned with the opening in the ridge may be used.

The prior art known to the present inventor utilizing a case for an electrical device which allows easy access for repair and inspection include U.S. Pat. No. 2,307,258, granted to W. A. DeSmidt et al., on Jan. 5, 1943 which discloses a housing into which the switch is mounted having a telescopic receiving cover which permits easy access.

U.S. Pat. No. 2,897,327, granted to W. A. DeSmidt et al. on Jan. 28, 1959 discloses essentially the same easy access cover structure.

U.S. Pat. No. 3,453,408 granted to C. Munc on Jul. 1, 1969 discloses snap in mounting system for placing circuit breakers into a panel.

U.S. Pat. No. 3,597,564 granted to Keith Lewis on Aug. 3, 1971 discloses a snap-on protective cover for protecting plunger type switches.

U.S. Pat. No. 3,723,689 granted to Lyle John Wenzel on Mar. 27, 1973 discloses a relay including a split housing to allow servicing

U.S. Pat. No. 3,953,699 granted to Karl-Heinz Scheibel, et al. on Apr. 27, 1976 discloses an electric switching apparatus utilizing spring clips to hold the apparatus in place.

U.S. Pat. No. 4,163,882 granted to Floyd M. Baslow on Aug. 7, 1979 discloses a hinged adaptor or frame member wherein one side of the frame member is pivotally movable to a position allowing access to the electrical attachment screws.

With the above-noted prior art, and problems in mind it is an object of the present invention to provide a housing for a safety switch wherein the housing may be easily attached to a support member and also wherein the cover of the housing may be quickly and easily removed for replacement or repair of the switches mounted therein.

It is another object of the present invention to provide a switch receiving slot in a housing cover for a

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safety switch wherein the switches may be quickly and easily wired and installed, removed and/or replaced and wherein the base member for supporting the housing includes outwardly extending securement members holding the individual switches in position when the cover is mounted upon the base.

#### BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings, like reference characters indicate like parts throughout the several drawings, unless otherwise indicated, and:

FIG. 1 is a perspective view of the inventive switch holder, taken from above and to one side, showing a base, a cover and one of a pair of switches;

FIG. 2 is a plan view of the base;

FIG. 3 is a sectional view of the base taken substantially along lines 3—3 of FIG. 2;

FIG. 4 is a bottom plan view of the cover with one switch shown in position;

FIG. 5 is a section view taken substantially along line 5—5 to FIG. 4; and

FIG. 6 is an enlarged fragmentary view taken substantially along lines 6—6 of FIG. 4.

#### BEST MODE FOR CARRYING OUT THE INVENTION

Referring first to FIG. 1, a switch holder 10 is shown to have a base 12, a cover 14, and a push-button style switch 16. While cover 14 is shown to be multi-sided, a simple four-sided arrangement could be used. The shown configuration is preferred, however, to limit sharp corners. Switch holder 10 may be molded from any suitable material, such as polycarbonate or the like. A pair of switches 16 is normally used, one being located at each end of cover 14.

Referring now to FIGS. 2 and 3, base 12 includes a cover receiving surface 18 and a mounting base 20. Mounting base 20 is generally planar allowing it to be mounted to any convenient flat surface, usually out of sight, at a teller's station. A pair of mounting screw holes 22 are provided for attaching base 12 to a hidden surface at the teller's station. Alternatively, the base could be taped to the surface. A boss 24 is provided around each hole 22 to reinforce the area around the hole. A pair of abutment members 26, each located at opposite ends of base 12, extend upwardly from receiving surface 18 for purposes to be described hereinafter. A set of four notches 28, hereinafter also referred to as cover mounting tab receiving openings, are located within a cover positioning ridge 30 (see FIGS. 1-3). Cover positioning ridge 30 is a raised portion of base 12 that is formed around the periphery of the base and extends upwardly therefrom a distance less than the height of abutment member 26. A wire opening or inspection hole 32 is provided in the center portion of base 12 to allow wires contained within a wall or the like to enter switch holder 10. It is to be understood that some installations require that twelve (12) wires be connected to the switches. As an alternate wire path, wire openings 34 are provided in ridge 30. Notches 28 may extend up into ridge 30, forming mounting tab openings 36.

Referring now to FIGS. 4-6, cover 14 is generally rectangular in shape and is formed from side panels 38 and a top panel 40. A switch receiving opening 42 is located in each end of cover 14. Switch opening 42 has three sides with the bottom being open and is preferably vertically oriented having a set-back wall 44 connecting

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it to side panel 38 via end panel 39. Switch opening 42 is sized to snugly receive a switch 46. A switch holding flange 48 provides a surface for switch 46 to be held against. A deformable flange 50 secured to switch 46 provides a slidable method of mounting switch 46 into opening 42. A wire access opening 52 is formed into cover 14 where it will coincide with opening 34 in base 12.

Cover 14 may be fastened to base 12 by using the same mounting fasteners used to mount the base 12 to mount both the base and the cover 14. The cover is provided with fastener openings 54 which are aligned with holes 22. A fastener tube 56 is formed integral with cover 14 and extends downwardly to a point which that when cover 14 is in contact with base 12 the tube is adjacent boss 24. When a fastener is placed through hole 54 in tube 56 and thereafter tightened, tube 56 contacts boss 24 and the mounting forces are transferred through tube 56 instead of through the cover's top panel 40 and side panels 38.

A second method of mounting cover 14 to base 12 uses a flexible tab system. Base 12 is mounted using fasteners acting directly on boss 56. A set of four mounting tabs 58 integral with a lower edge 60 near the corners of cover 14 are sized to engage tab receiving openings 36 of base 12. Lower edge 60 of cover 14 is sized to fit within the raised ridge 30 of base 12. This provides a more precise positioning of cover 14 and raises tab receiving opening above cover receiving surface 18. The side panels 38 to which tabs 58 are attached allow the tabs to be flexed sufficiently inward to allow them to pass by ridge 30 and then snap outwardly into openings 36. This method of mounting allows the cover to be removed quickly without the use of any tools.

#### OPERATION

In using the present invention, an appropriate location in a bank teller's station is selected to mount the switch holder 10. If the mounting fasteners are to be used only on base 12, the base is mounted with appropriate arrangement of the alarm wiring being installed. Next the switches 46 which have been wired are slid into switch receiving openings or slots 42. The switch 46 is prevented from moving axially by flanges 48, 50. Preferably, the wiring is completed prior to insertion. Once the switches 46 are mounted in the cover 14, the cover is mounted to base 12. Since the base 12 is already mounted, the cover 14 is fitted to the base by flexing side panels 38 inwardly allowing tabs 58 to pass by ridge 30 and snap outwardly into tab receiving openings 36 thereby snugly holding cover 14 in place. When cover 14 is in place, abutment members 26 contact their respective switches holding them in place and providing additional rigidity to each switch mount.

If it is desired to mount both the base 12 and the cover 14 at the same time by placing the fasteners through the fastener holes 54 in cover 14, the following procedure can be used. The switches 46 are slid into cover 14 as described above. The entire switch holder 10 is then placed on the desired mounting surface and the fasteners are directed through openings 54. This provides a more secure attachment of cover 14 to base 12, but requires an additional step to remove and replace a failed switch.

From the foregoing, further modifications, component modifications, component arrangement, and mode of utilization of the invention would be apparent to those skilled in the art which the invention is addressed.

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The scope of protection is not to be limited by the details of embodiment which have been illustrated and described. Rather, the scope of protection to be determined by the claims interpreted in accordance with the established rules of patent claim interpretation including the doctrine of equivalents.

What is claimed is:

1. A switch holder for mounting a switch associated with an alarm system, said switch holder comprising:

a cover having a plurality of side panels and a top panel, a switch receiving opening located in one of said side panels, said switch receiving opening being generally rectangular in shape and having an open end opposite said top panel which that said opening slidably receives said switch, said cover further including a mounting means for attachment of said cover; and

a base having a generally planar mounting surface, a cover receiving surface, and a cover mounting means receiving portion, said cover receiving surface includes a switch positioning abutment member which extends upwardly from said cover receiving surface, whereby said switch is held in position within said receiving opening by said positioning abutment member when said cover is mounted to said base.

2. A switch holder according to claim 1, wherein said cover includes a pair of switch receiving openings which are diametrically opposed to each other in said cover and said base further includes a pair of said abutment members.

3. A switch holder according to claim 2, wherein said base further includes a raised peripheral ridge having said mounting means receiving portion included therein.

4. A switch holder according to claim 3, wherein said mounting means comprises a plurality of mounting tabs formed integral with a lower edge portion of said side panels, said tabs extending horizontally outwardly a distance such that they engage said mounting means receiving portion of said base, said mounting means receiving portion being a plurality of openings in said ridge, said sidewalls being sufficiently flexible to allow said tabs to pass by said ridge and engage said openings.

5. A switch holder according to claim 4 wherein said base includes at least one fastener hole, said fastener hole being reinforced by a boss which extends upwardly from said cover receiving surface.

6. A switch holder according to claim 5, wherein said base includes at least one opening for wiring.

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7. A switch holder according to claim 5, wherein said cover includes at least one opening for wiring.

8. A switch holder according to claim 5, wherein said mounting means for attaching said cover to said base includes fastener openings in said top panel, said openings being aligned with said mounting hole in said base, said mounting means further including fastener tubes which extend downwardly from said top panel and, when mounted, said tubes engage said bosses such that any mounting forces are distributed through said tubes to said base.

9. A switch holder according to claim 1, wherein said plurality of side panels comprises a pair of elongated side wall and a pair of end walls, at least one of said end walls having a switch receiving opening formed therein with an open end located opposite said top panel, said switch receiving opening further including a switch holding flange adjacent said open end, said opening shaped to slidably receive a switch.

10. A switch holder according to claim 9, wherein said base further includes a raised peripheral ridge having said mounting means receiving portion included therein.

11. A switch holder according to claim 10, wherein said mounting means comprises a plurality of mounting tabs formed integral with a lower edge portion of said side panels, said tabs extending horizontally outwardly a distance such that they engage said mounting means receiving portion of said base, said mounting means receiving portion being a plurality of openings in said ridge, said sidewalls being sufficiently flexible to allow said tabs to pass by said ridge and engage said openings.

12. A switch holder according to claim 11, wherein said base includes at least one fastener hole, said fastener hole being reinforced by a boss which extends upwardly from said cover receiving surface.

13. A switch holder according to claim 12, wherein said base includes at least one opening for wiring.

14. A switch holder according to claim 12, wherein said cover includes at least one opening for wiring.

15. A switch holder according to claim 12, wherein said mounting means for attaching said cover to said base includes fastener openings in said top panel, said openings being aligned with said mounting hole in said base, said mounting means further including fastener tubes which extend downwardly from said top panel and, when mounted, said tubes engage said bosses such that any mounting forces are distributed through said tubes to said base.

\* \* \* \* \*

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# **EXHIBIT B**

LAW OFFICES OF  
**JENSEN & PUNTIGAM, P.S.**  
A PROFESSIONAL CORPORATION

ROBERT A. JENSEN  
bobj@jensenpuntigam.com

CLARK A. PUNTIGAM  
clark@jensenpuntigam.com

of counsel  
CHRISTOPHER O. DUFFY  
chrisd@jensenpuntigam.com

2033 SIXTH AVENUE, SUITE 1020  
SEATTLE, WA 98121-2584

(206) 448-3200 FAX: (206) 441-5514  
www.jensenpuntigam.com

SPECIALIZING IN PATENT,  
TRADEMARK AND COPYRIGHT  
LAW AND RELATED LITIGATION  
AND LICENSING

February 6, 2002

Corey King  
King Enterprises  
6921-164<sup>th</sup> Street SE  
Snohomish, WA 98296

RE: U.S. Patent No. 5,229,545

Dear Mr. King:

This office represents Washington Security Products, Inc. and Greg Good in intellectual property matters.

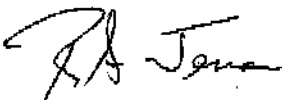
It has been brought to my attention that you are having made the switch holder that infringes at least claim 1 of U.S. Patent No. 5,229,545, which is owned by my client.

Based upon the patent protection provided by the U.S. Government, we must insist that you cease having made and selling or using a device such as I have in hand, which in my opinion infringes the above-noted patent.

A response agreeing to comply with our demands on or before the 15<sup>th</sup> of February, will prevent further action on our part.

Do not hesitate to call should you have any questions or comments.

Very truly yours,  
JENSEN & PUNTIGAM, P.S.



Robert A. Jensen

RAJ:mw

Enclosure: Patent No. 5,229,545

cc: Washington Security Products, Inc.

# **EXHIBIT C**



LAW OFFICES OF  
**JENSEN & PUNTIGAM, P.S.**  
A PROFESSIONAL CORPORATION

**COPY**

ROBERT A. JENSEN  
bj@jensenpuntigam.com  
CLARK A. PUNTIGAM  
clark@jensenpuntigam.com

2033 SIXTH AVENUE, SUITE 1020  
SEATTLE, WA 98121-2584  
(206) 448-3200 FAX: (206) 441-5514  
www.jensenpuntigam.com

SPECIALIZING IN PATENT,  
TRADEMARK AND COPYRIGHT  
LAW AND RELATED LITIGATION  
AND LICENSING

May 13, 2004

Julie C. VanDerZanden  
Christensen O'Connor Johnson &  
Kindness  
1420 5<sup>th</sup> Avenue, Suite 2800  
Seattle, WA 98101

RE: U.S. Patent No. 5,229,545  
SWITCH HOLDER FOR ALARM SYSTEMS  
Your ref: KIC<sup>1</sup>/<sub>6</sub>-5-19888

Dear Ms. VanDerZanden:

This is further to our correspondence in 2002 regarding a double toggle switch, which we indicated infringed at least upon claim 1 of the above-noted patent.

It has been brought to our attention that Mr. King has a very similar switch, if not an identical switch, available on the internet, and therefore, we must inquire as to whether or not this switch has been redesigned from the one we investigated in 2002.

I request that you treat this matter with some urgency since there is apparently a trade show next week, which we suspect Mr. King may be attending.

Do not hesitate to call should you have any questions or comments.

Very truly yours,  
Jensen & Puntigam, PS

  
Robert A. Jensen

RAJ:mw

cc: Greg Good

# **EXHIBIT D**

**United States Patent** [19]

[11] **Patent Number:** 4,497,526

Myers

[45] **Date of Patent:** Feb. 5, 1985

- [54] **CIRCUIT BOARD HOUSING HAVING SELF-CONTAINED MODULAR JACK**
- [75] **Inventor:** Ronald W. Myers, Landisburg, Pa.
- [73] **Assignee:** AMP Incorporated, Harrisburg, Pa.
- [21] **Appl. No.:** 479,248
- [22] **Filed:** Mar. 28, 1983
- [51] **Int. Cl.** ..... H01R 23/72
- [52] **U.S. Cl.** ..... 339/17 LC; 339/125 R; 339/176 M; 339/210 M
- [58] **Field of Search** ..... 339/17 L, 17 LC, 125 R, 339/126 R, 210 R, 210 M, 91 R, 176 M, 176 MP

*Primary Examiner*—John McQuade  
*Assistant Examiner*—Thomas M. Kline  
*Attorney, Agent, or Firm*—F. W. Raring

[57] **ABSTRACT**

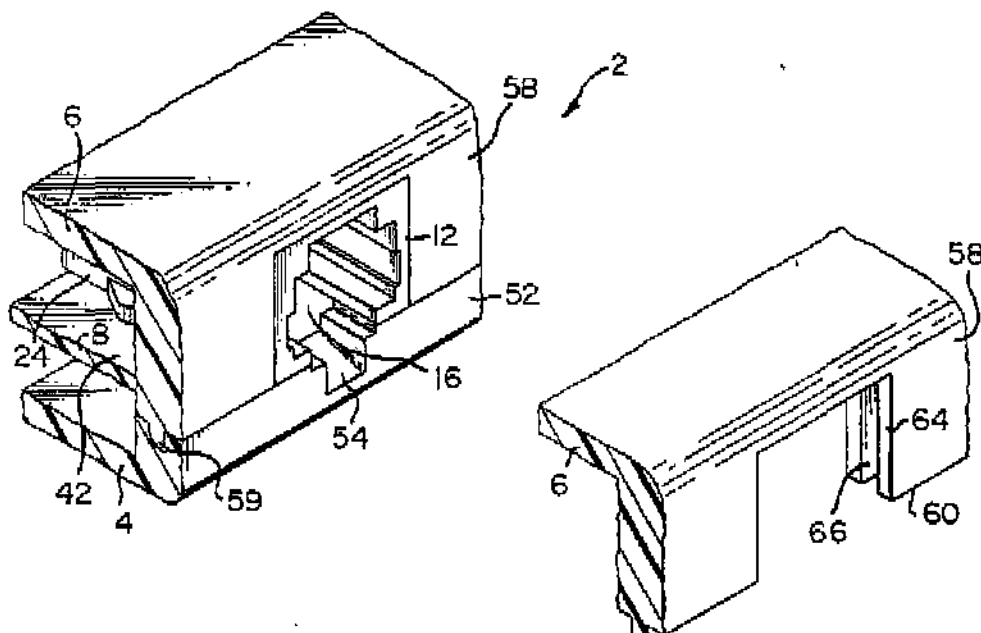
Circuit board housing comprises spaced-apart panels with the circuit board being between the panels. A modular jack is mounted on one surface of the circuit board and the panels have laterally extending flanges which form a wall of the circuit board housing. One of the flanges is provided with an opening which is in alignment with the opening in the modular jack. The modular jack has a clearance notch extending into one of its sidewalls and the circuit board has a similar notch in registry with the clearance notch, these notches providing clearance for an inserted modular plug. The latching shoulder for the modular jack is provided on one of the flanges rather than in the jack housing. These features, the latching shoulder on the flange and the clearance notches, permit a reduction in the thickness of the circuit board housing as measured between the panels.

[56] **References Cited**

**U.S. PATENT DOCUMENTS**

3,850,497	11/1974	Krumreich et al.	339/126 R
4,071,696	1/1978	Anderson	179/1 PC
4,202,593	5/1980	Abernethy et al.	339/125 R
4,210,376	7/1980	Hughes et al.	339/17 LC
4,221,458	9/1980	Hughes et al.	339/126 R
4,296,991	10/1981	Hughes et al.	339/176 MP
4,332,433	6/1982	Balde et al.	339/125 R
4,392,701	7/1983	Weidler	339/17 R

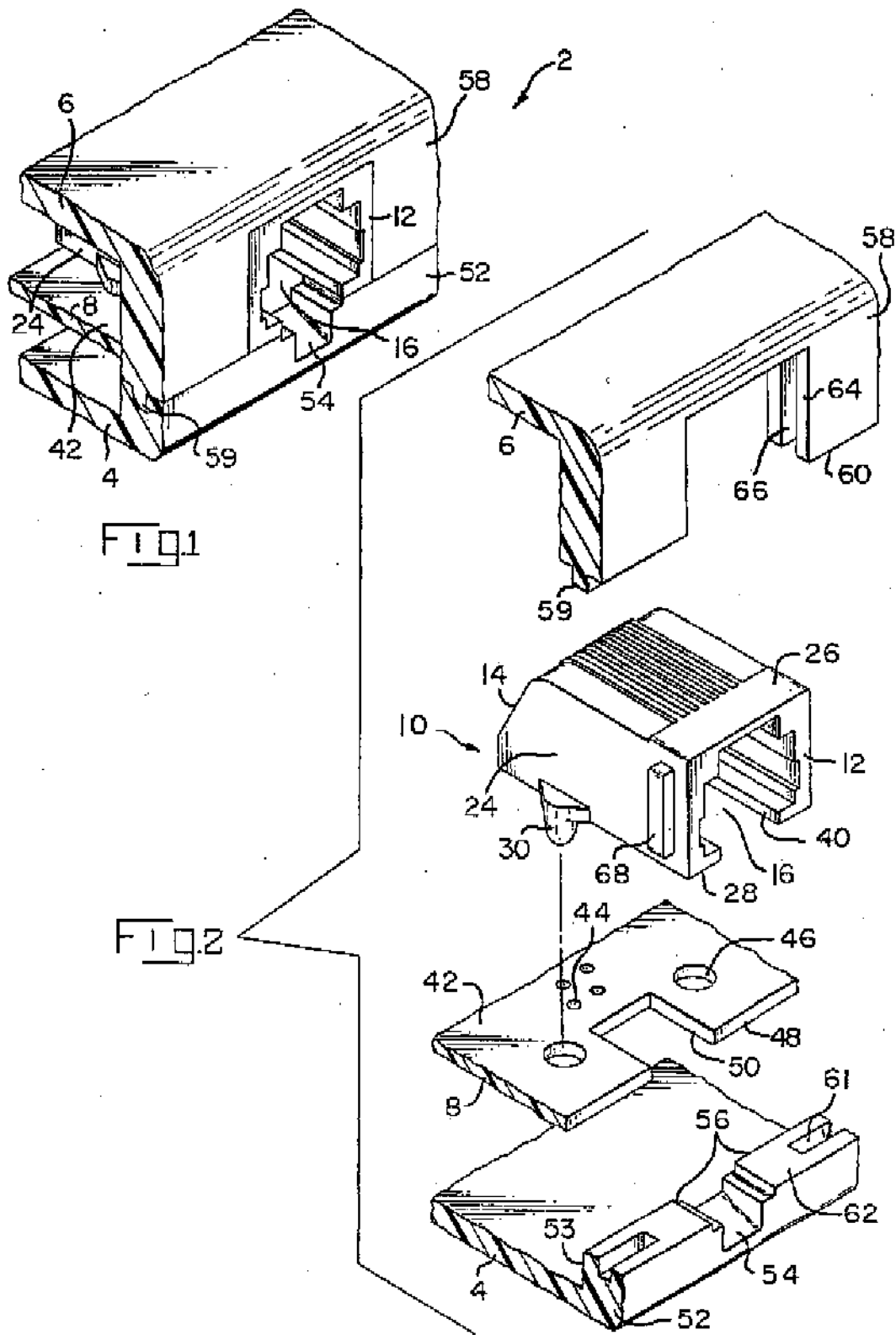
7 Claims, 5 Drawing Figures



U.S. Patent Feb. 5, 1985

Sheet 1 of 2

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## CIRCUIT BOARD HOUSING HAVING SELF-CONTAINED MODULAR JACK

### FIELD OF THE INVENTION

This invention relates to modular jack connector receptacles and to the combination of a circuit board housing having a circuit board therein and a self-contained modular jack, the circuit board housing being of reduced dimensions.

### BACKGROUND OF THE INVENTION

U.S. Pat. No. 4,210,376 discloses a known type of modular jack connector receptacle which is intended for mounting on a circuit board and which has conductors in the jack housing that are connected to conductors on the circuit board. Frequently, modular jacks of the type shown in U.S. Pat. No. 4,210,376 are used with circuit boards which in turn are contained within a housing that contains the circuit board and possibly additional electrical equipment. Many types of telephone equipment, for example, comprise circuit board housings having self-contained modular jacks with the plug receiving openings of the jack extending inwardly from one of the external walls of the housing.

Ordinarily, modular jacks of the type shown in the aboveidentified U.S. Pat. No. 4,210,376 can be used in such circuit board housings but under some circumstances, the circuit board housing must be relatively thin as measured between parallel panels and the dimensions of the modular jack may be such that the dimensional limitations for the circuit board housing cannot be satisfied. In other words, the modular jack requires a certain amount of space in the circuit board housing and the circuit board housing must be of unacceptable dimensions for some circumstances of use because of the limitations imposed by the modular jack.

The present invention is directed to the achievement of an improved modular jack which permits a substantial reduction in the thickness of a circuit board housing with which the modular jack is used. The invention is further directed to the achievement of the combination of a modular jack receptacle mounted on one surface of a circuit board which is contained in a circuit board housing of reduced dimensions.

A preferred embodiment of the invention comprises the combination of a modular jack receptacle mounted on one surface of a circuit board and a first panel which extends parallel to, and is spaced from, the other surface of the circuit board. The modular jack receptacle comprises an insulating housing having a mating end and a rearward end, a plug receiving opening extending into the mating end, the opening having opposed internal endwalls and first and second opening sidewalls. The housing also has oppositely facing external endwalls and first and second external sidewalls which are proximate to the first and second opening sidewalls. A plurality of conductors are contained in the housing in side-by-side relationship, each conductor having a contact portion which extends from the first opening sidewall diagonally into the opening from a location adjacent to the mating end. Each conductor also has a lead portion which extends to the rearward end of the housing and to the one surface of the circuit board. The second housing sidewall has a latching shoulder thereon facing inwardly of the opening for cooperation with a complementary latching shoulder on a modular plug. The combination of the modular jack receptacle, the circuit

board, and the panel is characterized in that the circuit board has one edge which extends parallel to one edge of the first panel and the first panel has a lip extending from the one edge thereof towards the one edge of the circuit board. The lip has an internal surface which is parallel to, and adjacent to, the one edge of the circuit board. The modular jack is mounted on the circuit board adjacent to the one edge thereof and is oriented with the mating end extending normally of the plane of the circuit board and parallel to the lip of the first panel. The lip has a recess therein which is centrally located with respect to the plug-receiving opening, the lip constituting at least portions of the mating end of the modular jack. The latching shoulder of the modular jack is on the internal surface of the lip and in alignment with the recess in the lip.

In accordance with a further embodiment, the circuit board has a circuit board notch extending inwardly from the one edge thereof which is in alignment with the recess in the lip. The modular jack has a clearance notch therein extending inwardly from the mating end, the clearance notch being in registry with the circuit board notch thereby to provide clearance for a modular plug upon insertion of the plug into the plug-receiving opening.

In accordance with a further embodiment, a second panel extends parallel to the first panel, the second panel having an internal surface which is against the first external sidewall of the modular jack, the second panel having a flange extending towards the lip of the first panel, the flange having an opening therein and the mating end of the modular jack is in the opening.

### DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a circuit board housing in accordance with the invention showing the wall of the housing in which a modular jack is mounted.

FIG. 2 is a view similar to FIG. 1 but showing the parts exploded from each other.

FIG. 3 is a sectional side view of the circuit board housing with a modular plug in alignment with the plug receiving opening of the modular jack.

FIG. 4 is a view similar to FIG. 3 but showing the modular plug coupled to the modular jack.

FIG. 5 is a frontal view of the modular jack.

A circuit board housing 2 in accordance with the invention comprises first and second parallel panels 4, 6 respectively which enclose the circuit board 8. The circuit board has a modular jack in accordance with the invention 10 mounted thereon adjacent to one edge of the circuit board.

The modular jack may be of the general type disclosed in the above-identified U.S. Pat. No. 4,210,376 and differs from the jack shown in the patent as will be described below. In general, the modular jack 10 comprises a molded jack housing having a mating end 12, a rearward end 14, and a plug-receiving opening 16 which extends into the mating end. The opening has opposed endwalls 18 and first and second opening sidewalls 20, 22, the first sidewalls being the upper sidewall as viewed in the drawing. The housing has oppositely directed external endwalls 24 and first and second external sidewalls 26, 28 which are proximate to the first and second opening sidewalls.

Mounting extensions 30 extend from the second external sidewall 28 and are dimensioned to be received in circular openings 46 in the circuit board 8. The conduc-

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tors 32 in the modular jack are arranged in side-by-side parallel relationship, each conductor having a contact portion 34 which extends into the opening 16 from the first internal sidewall at a location adjacent to the mating end 12. The conductors have contact portions 34 in the opening 16 and have downwardly extending lead portions 36 at the rearward end of the housing which are received in circuit board holes 44. The ends of these conductors would be soldered or otherwise connected to conductors on the circuit board.

The jack housing is provided with a clearance slot 40 which extends inwardly from the mating end in the lower portion of the housing. This clearance slot intersects the second opening sidewall 22 and the second opening external sidewall 28 so that only a portion of the floor of the opening on each side of the clearance slot or notch 40 remains.

The circuit board 8 has an upper surface 42 and has an edge 48 as previously noted which is proximate to the edges of the housing panels 4, 6, but which is recessed from one of these edges and from flanges 58, 52 on the panels 4, 6. The circuit board is also provided with the clearance notch 50 extending inwardly from the edge 48 which is in alignment with the clearance notch 40 when the modular jack is mounted on the circuit board.

The lower panel 4 has upwardly extending flange or lip 52 and a recess 54 is provided in this lip which is centrally located with respect to the plug-receiving opening 16 of the modular jack and with respect to the clearance notches 40, 50. The recess 54 has a central portion which is inclined upwardly as viewed in FIG. 2 towards the internal surface 53 of the lip 52. It will be apparent that this recess 54 is of the same configuration as the recess in the mating end of a modular jack. This recess is dimensioned to receive a latch arm 76 of the modular plug 70 as described below and surface portions 56 of the internal surface 53 on each side of the recess function as latch shoulders for cooperation with the latching shoulders 78 of the latch arm 76 of the plug 70.

The second panel member 6 has a depending flange 58 having a lower edge 60 which is against the upper edge 62 of the lip 52 when the parts are assembled. Advantageously, inter-engaging ribs 59 and recesses 61 are provided on the flange and on the lip to locate the flange and lip accurately against each other.

The flange 58 has an opening 64 which is dimensioned to receive the mating end of the modular jack as shown in FIG. 3 so that the face of the jack will be flush with the surface of the flange 58. The flange 58 and the lip 52 form one wall of the circuit board housing which extends normally of the panels 4, 6.

The modular jack is precisely positioned with respect to the opening 64 by means of recesses 66 in the opposed edges of the opening 64 which receive ribs 68 extending from the endwalls 24 of the modular jack. In the completed assembly then, the opening 64 and the shoulders 56 will be precisely located relative to the modular jack housing.

The modular plug 70 is of the type described fully in U.S. Pat. No. 3,860,316. The plug comprises a housing having a leading end 72 and upper and lower surfaces 74, 75. The contact terminals in the plug are exposed at the upper surface 74 adjacent to the leading end 72 so that they will contact the contact portions 34 of the conductors in the jack.

The previously identified latch arm 76 extends from the plug housing adjacent to the leading end 72 and is

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beneath the lower surface 75 of the plug. The latch arm has shoulders 78 intermediate its ends which lodge against the shoulders 56 when the plug is inserted into the jack as shown in FIG. 4.

When the plug is inserted as shown in FIG. 4, the lower portions of the plug housing are received in the aligned notches 40, 50 in the jack and in the circuit board. The housing is of substantially reduced height as viewed in FIG. 3 as compared with known types of housing and as a result, the overall thickness of the circuit board housing, as measured between the surfaces of the panels 4, 6, is substantially reduced. This reduction is achieved by virtue of the provision of the notches 40, 50 and the provision of the recess 54 in the lip 32 so that portions of this lip, in effect, function as parts of the modular jack.

I claim:

1. The combination of a modular jack receptacle mounted on one surface of a circuit board and a first panel which extends parallel to, and is spaced from, the other surface of the circuit board, the modular jack receptacle comprising an insulating housing having a mating end and a rearward end, a plug receiving opening extending into the mating end, the opening having opposed internal endwalls and first and second opening sidewalls, the housing having oppositely facing external endwalls and first and second external sidewalls which are proximate to the first and second opening sidewalls, a plurality of conductors in side-by-side relationship, each conductor having a contact portion which extends from the first opening sidewall diagonally into the opening from a location adjacent to the mating end and a lead portion which extends to the rearward end of the housing and to the one surface of the circuit board, the opening having latching shoulder means thereon facing inwardly of the mating end for cooperation with a complementary latching shoulder on a modular plug, the combination of the modular jack receptacle, the circuit board, and the panel being characterized in that:

the circuit board has one edge which extends parallel to one edge of the first panel, the first panel having a lip extending from the one edge thereof towards the one edge of the circuit board, the lip having an internal surface which is parallel to and adjacent to the one edge of the circuit board,

the modular jack being mounted on the circuit board adjacent to the one edge thereof and being oriented with the mating end extending normally of the plane of the circuit board and parallel to the lip of the first panel,

the lip having a recess therein which is centrally located with respect to the plug-receiving opening, the lip constituting at least portions of the mating end of the modular jack, the latching shoulder means of the modular jack being on the internal surface of the lip adjacent to the recess in the lip.

2. The combination set forth in claim 1 characterized in that the circuit board has a circuit board notch extending inwardly from the one edge thereof, the circuit board notch being in alignment with the recess in the lip, and the modular jack has a clearance notch therein extending inwardly from the mating end, the clearance notch being in registry with the circuit board notch thereby to provide clearance for a modular plug upon insertion of the plug into the plug-receiving opening.

3. The combination set forth in claim 2 characterized in that the conductors in the modular jack are stamped and formed sheet metal conductors, the conductors

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extending across the rearward end of the modular jack and to circuit board conductors on the circuit board.

ular jack in position on the circuit board and in the opening in the flange.

4. The combination set forth in claim 3 characterized in that a second panel extends parallel to the first panel, the second panel having an internal surface which is against the first external sidewall of the modular jack, the second panel having a flange extending towards the lip of the first panel, the flange having an opening therein, the mating end of the modular jack being in the opening.

5. The combination set forth in claim 5 characterized in that the interengaging means comprises ribs on the endwalls of the modular jack and rib-receiving recesses in the flange.

5. The combination set forth in claim 4 characterized in that interengaging means are provided on the second panel and on the modular jack for maintaining the mod-

7. The combination set forth in claim 1 characterized in that a second panel extends parallel to the first panel, the second panel having an internal surface which is against the first external sidewall of the modular jack, the second panel having a flange extending towards the lip of the first panel, the flange having an opening therein, the mating end of the modular jack being in the opening.

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**Exhibit E. USPN 4,202,593** to inventors Abernethy et al. This device includes a cover (74) with a three-sided rectangular switch receiving opening (76) and a planar base (10) with an upwardly extending abutment member (grooves of 14). Plugs (62) in the cover mate with counterbores (58) in the base to form mounting means and mounting means receiving portions. This device description has been available since at least as early as September 29, 1991.

# **EXHIBIT E**

**United States Patent** [19]  
**Abernethy et al.**

[11] **4,202,593**  
 [45] **May 13, 1980**

[54] JACK

[56]

**References Cited**

**U.S. PATENT DOCUMENTS**

[75] Inventors: **Lynn W. Abernethy, Advance; Elvert S. Watts, Walkertown, both of N.C.**

T958,009	5/1977	Snyder .....	339/99 R
T961,003	8/1977	Krumreich .....	339/176 M
3,850,497	11/1974	Krumreich .....	339/126 R

[73] Assignee: **AMP Incorporated, Harrisburg, Pa.**

*Primary Examiner—Joseph H. McGlynn*  
*Assistant Examiner—John S. Brown*  
*Attorney, Agent, or Firm—Gerald K. Kita*

[21] Appl. No.: 31,791

[57] **ABSTRACT**

[22] Filed: **Apr. 20, 1979**

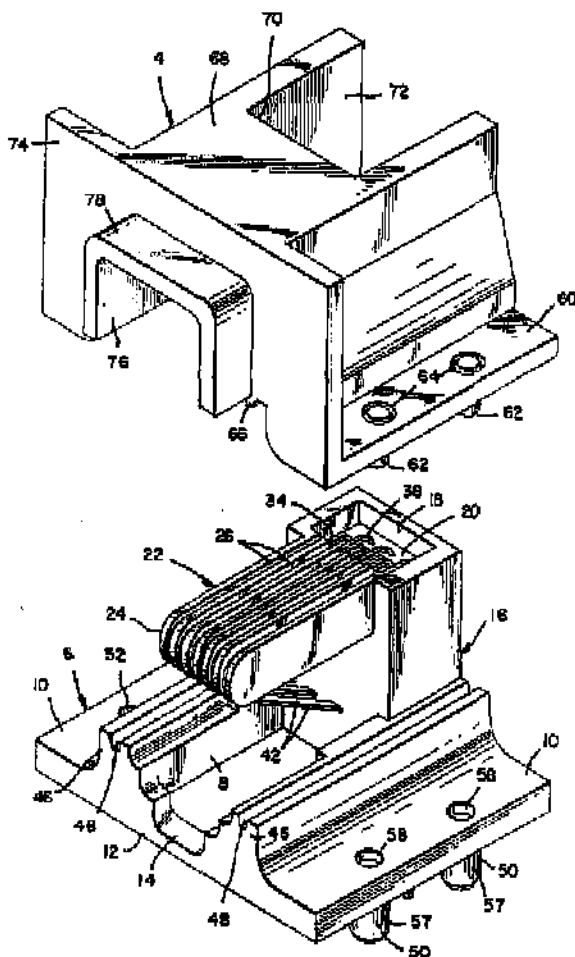
A telephone jack is disclosed for modular telephone connection. The jack includes an anvil constructed to receive a tool for inserting press fit contacts of the jack into a printed circuit board. A housing containing the contacts is secured to the board with expansible sleeves. Expansion plugs for the sleeves are carried by the housing.

[51] Int. Cl.<sup>2</sup> ..... **H01R 13/54; H01R 13/64**

[52] U.S. Cl. .... **339/125 R; 339/176 M; 339/184 R**

[58] Field of Search ..... **339/91 R, 17 C, 17 LC, 339/193 P, 196, 125 R, 206, 207, 208, 176 M, 92 M, 99 R, 126 R, 19, 176 MP, 205, 184**

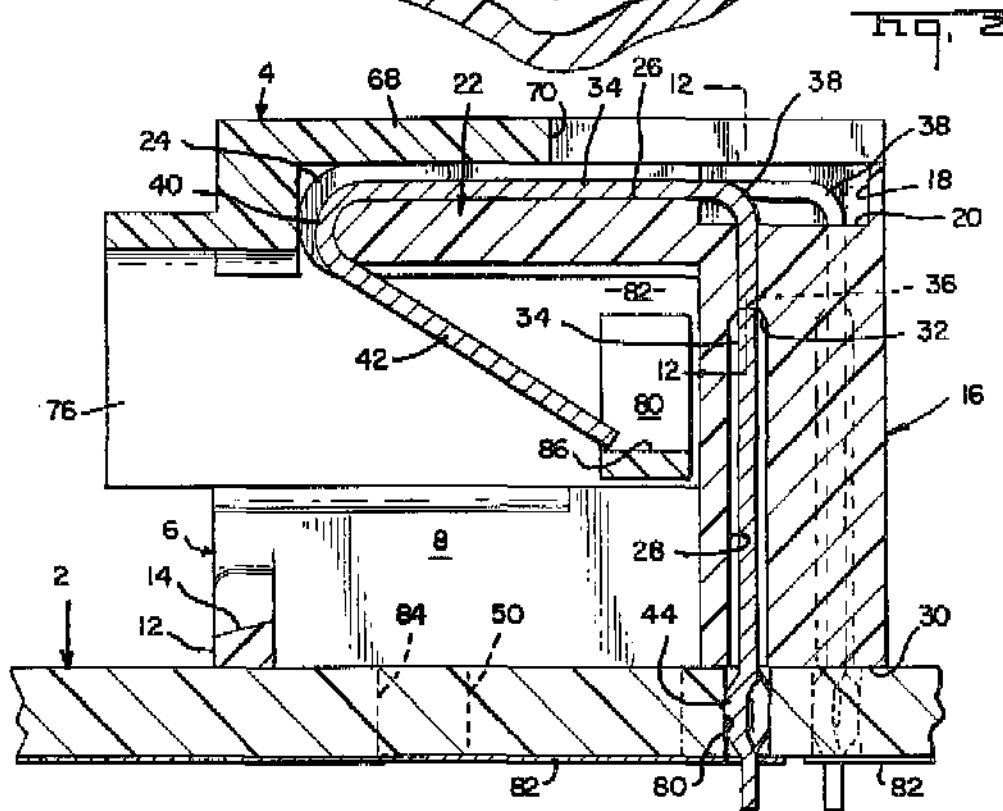
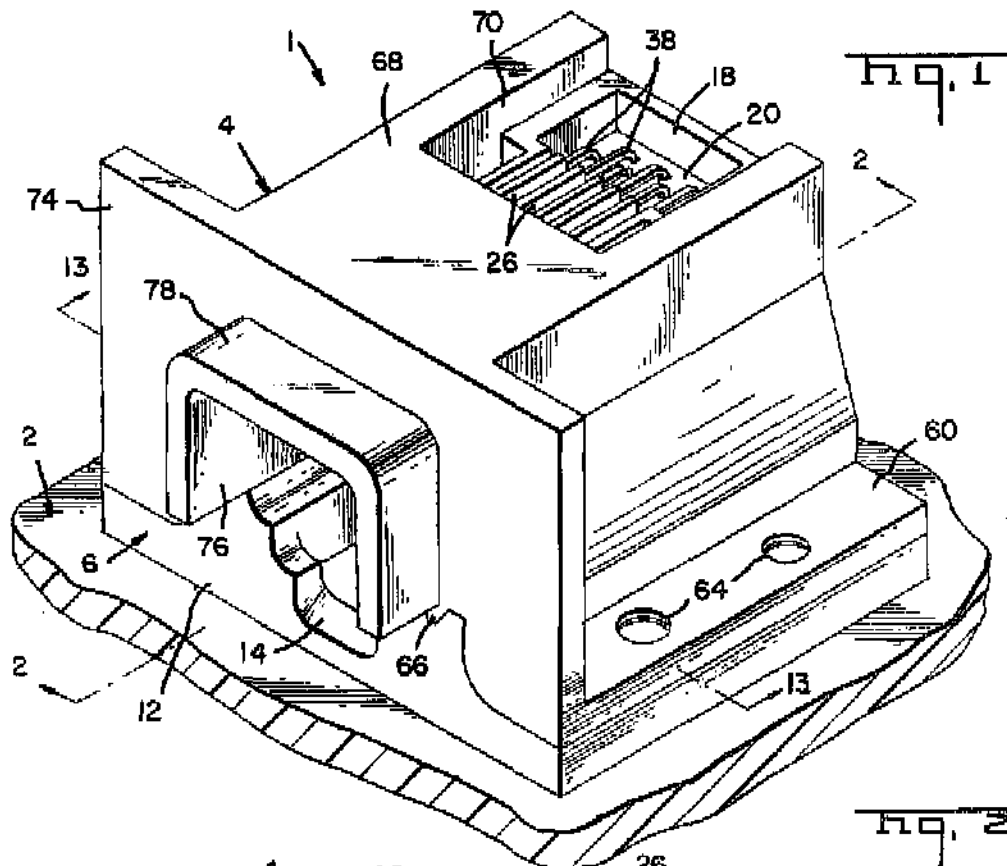
**6 Claims, 13 Drawing Figures**



U.S. Patent May 13, 1980

Sheet 1 of 5

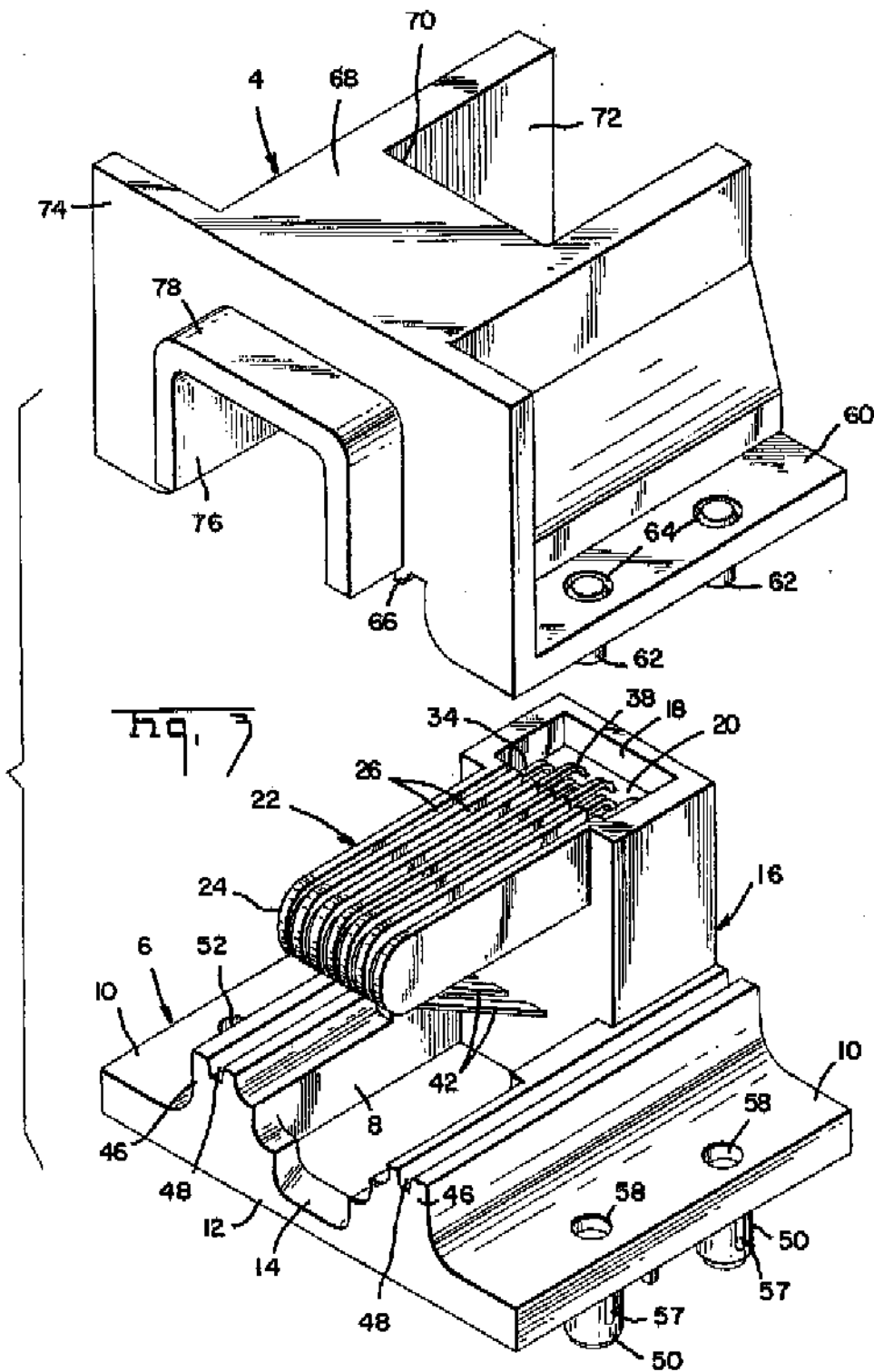
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U.S. Patent May 13, 1980

Sheet 2 of 5

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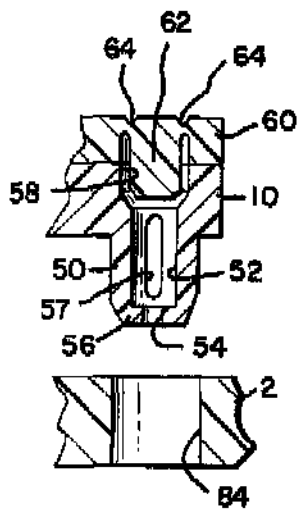
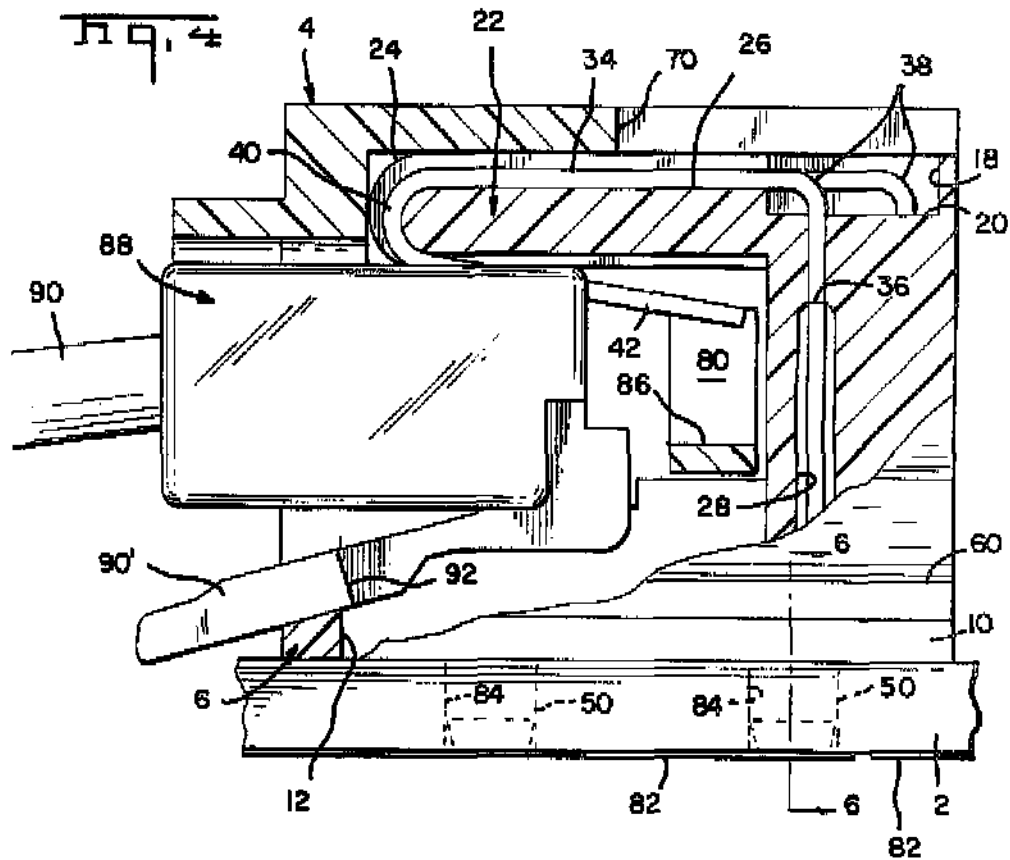


Fig. 5

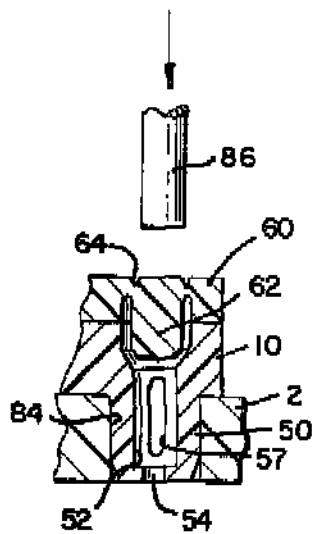


Fig. 6

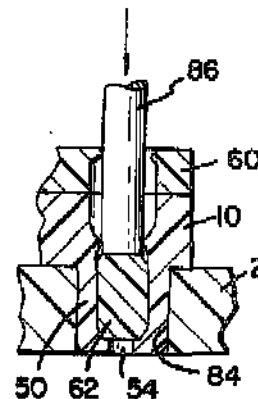
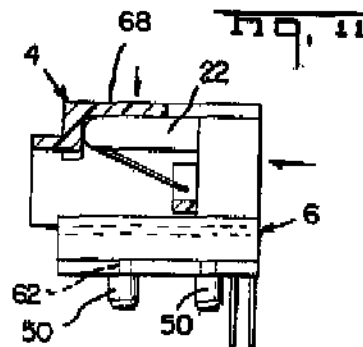
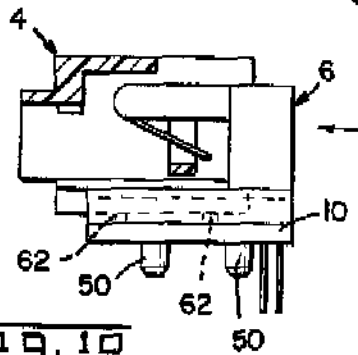
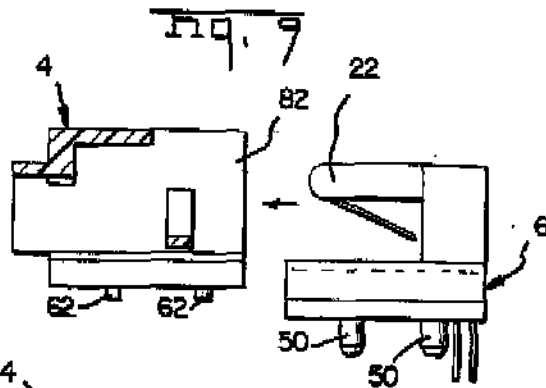
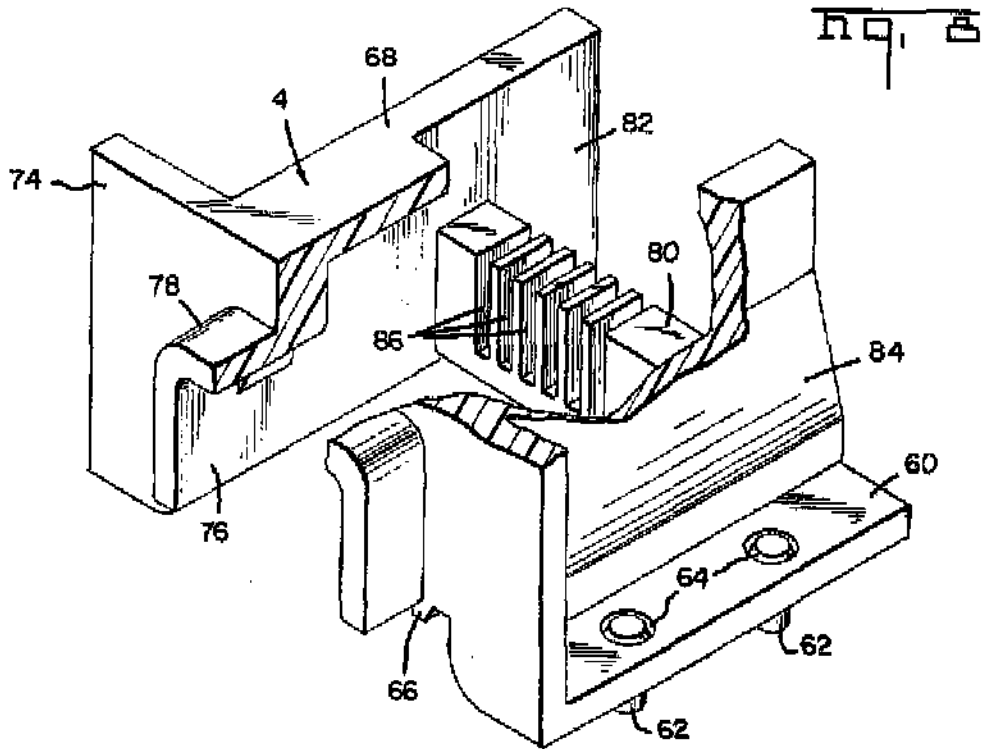


Fig. 7

U.S. Patent May 13, 1980

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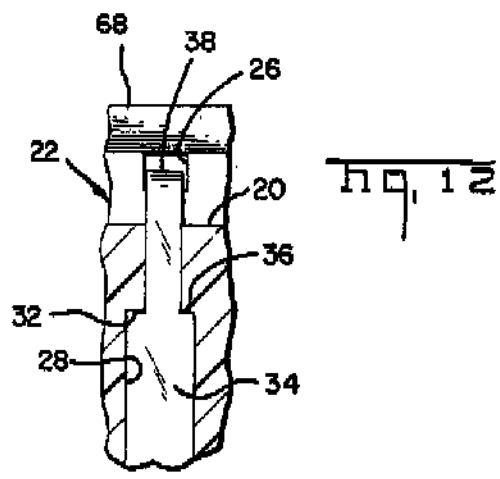
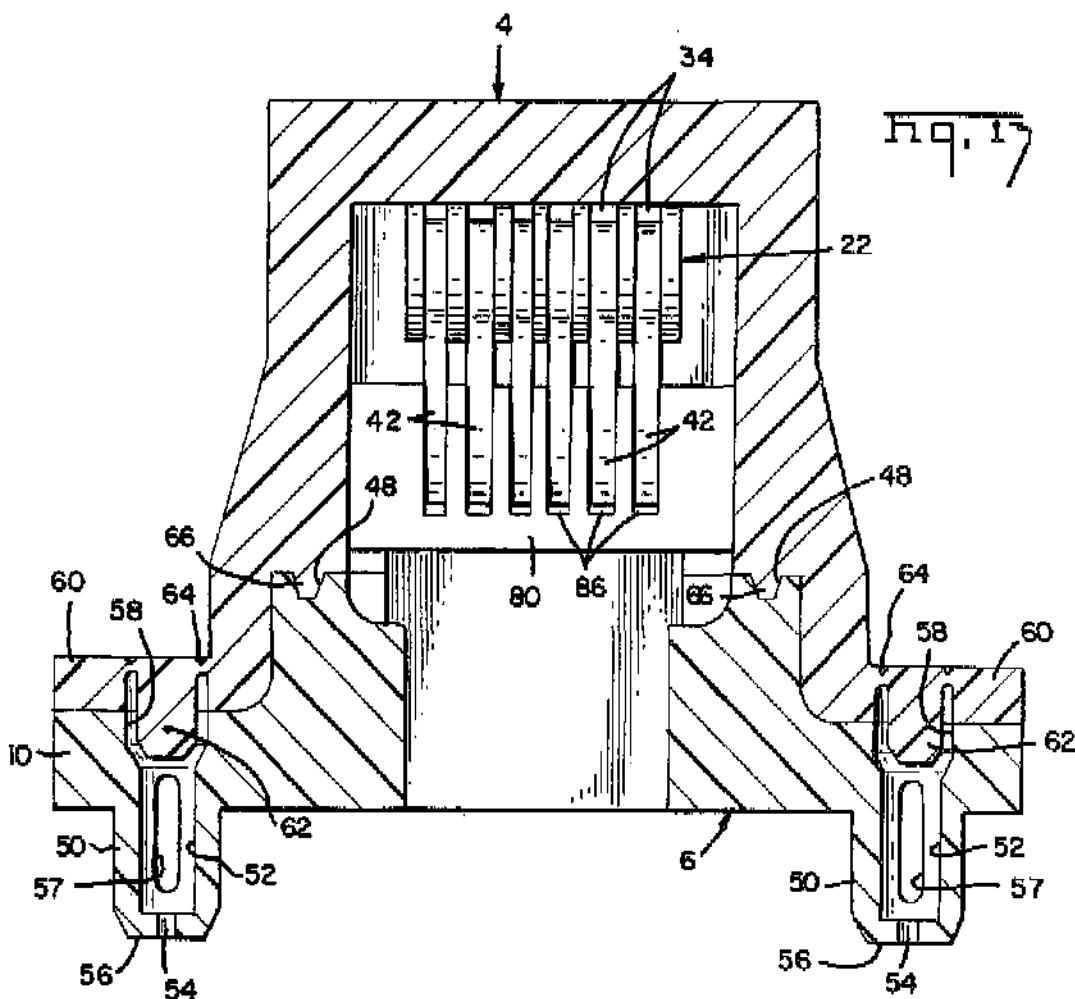


U.S. Patent

May 13, 1980

Sheet 5 of 5

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## JACK

## FIELD OF THE INVENTION

The present invention relates to improvements in a standard jack for a national telephone network.

## BACKGROUND OF THE INVENTION

A jack is disclosed in U.S. Pat. No. 3,850,497 in which a plurality of spring contacts project into a plug receiving cavity. Each contact is spliced by a compression sleeve connection to a corresponding insulated wire.

## SUMMARY OF THE INVENTION

A jack according to the present invention includes resilient beam contacts protruding from a base for wedged connection in a circuit board. The base is provided with an anvil which receives a ram type tool for driving the contacts into a circuit board. The base includes expansible sleeves for insertion into apertures of a circuit board. The cover is secured to the base and is provided with expansion plugs in alignment with the sleeves. The plugs are connected to the cover and are constructed for separation from the cover and for forcible insertion into the sleeves, forcing the sleeves to expand tightly against the walls of the circuit board apertures. The base includes an interior platform having grooves in which the contacts are supported. A comb structure integral with the cover supports free ends of the contacts within a plug receiving cavity. A window opening in the cover provides access to the comb structure to allow for molding of the same integral with the cover. The window opening additionally provides access to the anvil surface. The contacts are constructed to resist dislodgement during insertion into a circuit board.

## OBJECTS

An object of the present invention is to provide an improved jack having an anvil surface for a ram type tool for forcibly inserting terminals of the jack into a circuit board, the terminals being constructed to prevent dislodgement during the insertion operation.

Another object of the present invention is to provide a jack for telephone interconnection having electrical terminals for wedged connection in a circuit board, together with expansible sleeves for mounting a housing of the jack on a circuit board.

Another object of the present invention is to provide a telephone jack having electrical contacts mounted in a two piece housing provided with expansible sleeves and separately connected wedges in alignment with the sleeves and constructed for wedged insertion within the sleeves to expand the same.

Other objects and advantages of the present invention will become apparent from the following detailed description taken in conjunction with the drawings.

## DRAWINGS

FIG. 1 is an enlarged fragmentary perspective of a modular jack according to the present invention.

FIG. 2 is an enlarged elevation in section along the line 2-2 of FIG. 1.

FIG. 3 is an enlarged perspective with parts exploded of the jack illustrated in FIG. 1.

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FIG. 4 is an enlarged elevation in section similar to FIG. 2 and illustrating connection of the jack contacts with a plug connector.

FIGS. 5, 6, & 7 are fragmentary enlarged sections diagrammatically illustrating an expansible sleeve connection of the jack to a circuit board.

FIG. 8 is an enlarged perspective of a cover portion of the jack with parts broken away to illustrate a shelf with a comb structure.

FIGS. 9, 10, & 11 are diagrammatic views illustrating assembly of the cover to a base of the jack according to the invention.

FIG. 12 is an enlarged fragmentary section along the line 12-12 of FIG. 2.

FIG. 13 is an elevation in section of the embodiment shown in FIG. 1.

## DETAILED DESCRIPTION

With more particular reference to the drawings, there is illustrated generally at 1 in FIG. 1 a modular jack adapted for mounting to a printed circuit board, a portion of which is illustrated at 2. As shown in FIG. 3, the jack includes a two piece housing, a cover portion 4, and a base portion 6, each of unitary construction and molded from a suitable dielectric material. The base is provided with a central opening 8 through a bottom wall 10. The opening 8 is defined at one end by a side wall 12 of the base having an opening 14 therethrough communicating with the opening 8. The opening 14 is of stepped pyramid profile to conform with the profile of a plug type electrical connector, as will be explained. An opposite end of the opening 8 is defined by a rectangular pillar 16 projecting vertically from the bottom wall 10. The top of the pillar 16 is provided with a rectangular recess 18 having a bottom wall 20 serving as an anvil for a ram type tool to be received in the recess 18 for a purpose to be described. The pillar 16 further includes an integral platform 22 generally parallel with the bottom wall 10, with a clearance separating the platform 22 and the bottom wall 10. The platform 22 is in vertical alignment with the opening 8 and is provided with a radiused end 24. As shown in FIGS. 2 and 3 the platform is provided with a plurality of parallel grooves 26 in the top planar surface of the platform and in the rounded end 24. The grooves 26 communicate with the recess 18.

As shown in FIGS. 2 and 12, the pillar 16 is provided with a plurality of vertically extending cavities 28 communicating with a bottom 30 of the pillar and perpendicularly through the bottom wall 20 of the recess 18. Each cavity has a stepped cross section, that is, a relatively large cross section for a portion of its length extending from the pillar bottom 30, and a reduced cross section for a portion of its length extending from the bottom wall 20. An inverted shoulder 32 is provided for the reduced cross section intersects the enlarged cross section. Each cavity 28 receives an elongated resilient metal terminal or contact 34 which is inserted into the cavity 28, first, through the bottom 30 until emerging perpendicularly through the bottom wall 20. Each terminal 34 includes a shoulder 36 which seats against the inverted shoulder 32 to locate the terminal in proper position. Each terminal is then bent laterally of its length at a first bend 38 to follow along a corresponding groove 26 of the platform 22. Each terminal 34 is again bent with a second arcuate bend 40 to follow along the groove 26 in the arcuate end 24 of the platform 22. A free end 42 of each terminal projects diagonally

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nally from the end 24 into the clearance separating the platform 22 and the bottom wall 10. The other free end 44 of each terminal projects from the bottom 30 and is bifurcated into a pair of leg portions which are offset laterally from each other to provide a relatively widened combined cross section for a purpose to be described.

As shown in FIG. 3 the base 6 is provided with relatively thick elongated ribs 46 on either side of the profiled opening 14, and on either side of the opening 8. Each thick rib 46 is provided with a narrow longitudinal groove 48. The bottom wall 10 is provided further with a plurality of integral depending sleeves 50, the details of which are illustrated more particularly in FIGS. 13 and 5. Each sleeve has a cylindrical recess 52 terminating at an end wall 56 having a core pin hole 54 with small slots 57 in the cylindrical sides. Each recess 52 communicates with an enlarged flared counterbore 58 in the top surface of the bottom wall 10.

FIGS. 3 and 13 illustrate the cover 4 having horizontal flanges 6 in which are molded depending cylindrical wedges or plugs 62 connected initially by frangible webs 64 to the flanges 6. The cover 4 further is provided with integral thin ribs 66 which fit within the grooves 48 of the base 10. FIGS. 3 and 8 illustrate additional details of the cover 4. The cover has a top wall 68 provided with a rectangular opening 70 which opens along one side into an open end 72. The opposite end includes and integral wall 74 having a plug receiving opening 76 partially encircled by a bezel 78. FIG. 8 illustrates an integral shelf 80 bridging between spaced side walls 82 and 84 of the cover 4. The shelf 80 is provided with vertical, spaced slots 86. The opening is in alignment with the shelf and provides adequate clearance for molding the shelf.

FIGS. 9, 10, and 11 illustrate assembly of the cover 4 and base 6. FIG. 9 illustrates the platform 22 being introduced into the open end 82 of the cover. FIG. 10 illustrates sliding of the plugs 62 of the cover 4 along the bottom wall 10 of the base 6 until the plugs 62 register over the sleeves 50 of the base. FIG. 11 illustrates the cover 4 fully assembled on the base 6 when the plugs 62 enter the counterbores of the sleeves 50 and when the top wall 68 of the cover registers against the top of the platform 22, covering portions of the terminals 34 which are fully recessed in the grooves of the platform. The platform covers the shelf 80 which is in the clearance between the platform and the bottom wall 10. The contact ends 42 are captivated in the slots 82 of the shelf. The shelf thereby serves as a comb separating the contact ends 42. Thereafter, the assembly is ultrasonically welded together, with the thin ribs 66 of the cover, being of relatively low mass, absorbing most of the ultrasonic energy and fusing to the base 10.

The assembly is readily assembled to a circuit board 2, as described by reference to FIGS. 1 and 2. The tool receiving recess 18 is fully exposed through the window opening 70 to receive a ram type tool of any suitable type, with a direction of ram displacement vertically along the lengths of the terminals 34 and vertically along the pillar 16. The ram will press against anvil surface 20 to forceably insert the terminal ends 44 into corresponding apertures 80 of the circuit board 2. The offset leg portions of the terminals engage the sides of the apertures 80 and are forced to slide against and along each other to reduce their combined cross section sufficiently to enter the apertures. The leg portions additionally will frictionally engage each other to limit

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their sliding along each other, so that the legs frictionally wedge against each other and tightly against the sides of the aperture 80. The terminal ends 44 also will frictionally engage plated circuit paths 82 of the circuit board 2. Alternatively, they may be soldered to the paths 82.

FIGS. 5, 6, and 7 illustrate additional assembly steps wherein the sleeves 50 enter apertures 84 in the circuit board 2. Thereafter, a cylindrical ram type tool illustrated at 86 will engage each plug 62, fracturing the thin web 64 of each plug and forcing the plug into the hollow interior 52 of a corresponding sleeve 50. Each plug 62 is slightly oversized in respect to the inner diameter of the sleeve 50 such that the plug 62 will radially expand the sleeve 50 into tight engagement with the sides of the apertures 84.

FIG. 4 illustrates an electrical connector plug 88 secured to a multiple conductor cable 90. The plug is of the type described in U.S. Pat. 3,850,497 having a profile commensurate with the cooperating openings 76 and 14. The plug is received in the space or clearance between the platform and the bottom wall 10. A resilient lever 90 of the plug has a shoulder 92 which registers in latched engagement against the interior of the wall 12. Electrical contacts, not shown, on the plug engage corresponding ends 42 of the terminals 34, deflecting the same to assure frictional and electrical contact therewith. The free ends 42 remain confined and separated from one another in the grooves 86 of the shelf 80.

Although a preferred embodiment of the present invention is disclosed, other embodiments and modifications which would be apparent to one having ordinary skill in the art are intended to be covered by the spirit and scope of the appended claims.

What is claimed is:

1. In a jack having a housing containing a plurality of resilient contacts communicating with a cavity of the housing into which an electrical jack is plugged to connect electrically with the contacts, the improvement comprising:

said housing including a base portion providing an interior platform having grooves in which lengths of said contacts are supported,

free ends of said contacts projecting into a space between said platform and a bottom wall of said base,

said contacts having terminal portions projecting from said bottom wall together with expansible sleeves integral with said bottom wall,

a cover secured to said base having a jack receiving opening communicating with said space.

2. The structure as recited in claim 1, wherein, said cover includes an integral shelf for supporting and separating said contact free ends.

3. The structure as recited in claim 1, wherein, said platform is connected by a pillar to said bottom wall,

said terminal portions are in alignment with said pillar, and

said pillar has an anvil surface perpendicular to the axes of said terminal portions.

4. The structure as recited in claim 3, wherein, said cover includes an opening in alignment with said anvil surface and with said shelf, and

said platform projects across said opening to overlie said shelf.

5. The structure as recited in claim 1, wherein, said base includes a wall having a profiled opening conform-

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ing to the profile of a jack to be received in said jack receiving opening.

6. The structure as recited in claim 1, wherein said cover includes plugs in alignment with said sleeves, said plugs being oversized with respect to the interiors of s

said sleeves so that upon separation of said plugs from said cover and insertion into said sleeves, said sleeves are expanded.

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