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SPRUSON & FERGUSON

AUSTRALIA

PATENTS ACT 1990

PATENT REQUEST: STANDARD PATENT

I/We, the Applicant(s)/Nominated Person(s) specified below, request I/We be granted a patent for the invention disclosed in the accompanying standard complete specification.

[70,71] Applicant(s)/Nominated Person(s):

American Telephone and Telegraph Company, incorporated in New York, of
32 Avenue of the Americas, New York, New York, 10013, UNITED STATES OF
AMERICA

[54] Invention Title:

Universal Patch Panel for Communications Use in Buildings

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By:



Registered Patent Attorney

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NOTICE OF ENTITLEMENT

I, Kenneth Graham Johnston, of 30 Branscombe Gardens, Winchmore Hill, London N21 3BN, England

being authorised by the Applicant/Nominated Person in respect of an application entitled:

UNIVERSAL PATCH PANEL FOR COMMUNICATIONS USE IN BUILDINGS

state the following:-

1. The Applicant/Nominated Person has, for the following reasons, gained entitlement from the actual inventor(s):-


The Applicant is the assignee of the actual inventor(s)

2b. The Applicant/Nominated Person is entitled to rely on the basic application(s) listed on the Patent Request as follows:

The Applicant is the assignee of the basic applicant(s).

3. The basic application(s) listed on the Patent Request is/are the application(s) first made in a Convention Country in respect of the invention.

DATED this 1st day of June 1993


.....
(Signature)

K.G. Johnston
The Applicant's Attorney



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- (71) Applicant(s)
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- (56) Prior Art Documents
AU 656152 87090/91 H01R 13/631 13/629
US 4168874
AU 499385 20694/76
- (57) Claim

1. A device which is capable of being mounted in an opening in a panel, and which is adapted to hold a component, said device comprising two parallel side portions each being made of a plastics material, each side portion being provided with two depending portions which depend from opposite ends of the respective side portion, two moveable portions, each extending between corresponding ends of said side portions and being hingedly connected thereto and each being biased resiliently outwardly, each moveable portion including two detents projecting from an outer surface of said moveable portion such that when forces are caused to be applied to free end portions of said moveable portions to cause the free end portions to be moved toward each other, the device is capable of being inserted from a front surface of the panel into said opening in said panel until the front surface of the panel abuts the depending portions of the side portions whereupon the application of said forces is discontinued to allow the moveable portions to move outwardly and cause said detents to snap-lock into engagement with a rear surface of the panel on the opposite side of the panel to the free end portions.

6. A patch panel which comprises a panel plate having an array of openings formed therein; and an adapter which is mounted in an opening in the panel plate, and which is adapted to hold a component, said adapter comprising two parallel side portions each being made of a plastic material, each side portion being provided

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with two depending portions which depend from opposite ends of the respective side portion,

two moveable arm portions, each extending between corresponding ends of said side portions and being hingedly connected thereto and each being biased resiliently outwardly, each moveable arm portion including two detents projecting from an outer surface of said moveable arm portion such that when forces are caused to be applied to free end portions of said moveable arm portions to cause the free end portions to be moved toward each other, the adapter is capable of being inserted from a front surface of the panel plate into one of said openings in said panel plate until the front surface of the panel plate abuts the depending portions of the side portions whereupon the application of said forces is discontinued to allow the moveable arm portions to move outwardly and cause said detents to snap-lock into engagement with a rear surface of the panel plate on the opposite side of the panel plate to the free end portions to hold said adapter mounted within said one of the openings in the panel plate.

UNIVERSAL PATCH PANEL FOR COMMUNICATIONS USE IN BUILDINGS

Technical Field

This invention relates to a universal patch panel for
5 communications use in buildings.

Background of the Invention

In closets in buildings, connections between transmission media
are made through connectors mounted on patch panels. Typically, a patch
panel includes a plate having an array of openings therein. A connector is
10 mounted in each of the openings. Connectors which are used include
optical fiber connectors, coaxial connectors and copper modular connectors.

Arrangements for releasably holding connectors in a panel plate
have been disclosed in the prior art. U.S. Patent 5,096,439 discloses a plate
having an opening therein. A rear side of the wall plate includes a collar for
15 engaging the connector and holding it together with the wall plate. The
collar is formed by sidewalls and top and bottom walls which connect the
sidewalls. Grooves extend from a front face of the wall plate inwardly along
each sidewall and terminate in a ledge. A connector such as a jack to be
received in the opening in the wall plate includes a cavity for receiving a
20 plug and a latching system formed along each of opposed sidewalls thereof.

The latching system includes two collinear spaced stop members and a
flexible member which includes a wedge-shaped tab. The stop members
and the flexible member are spaced apart a first distance and the distance
between the stop members and the front surface of the connector is a
25 distance which corresponds to the distance between the back edges of the
sidewalls and the front surface of the wall plate. The distance between the
back edge of each sidewall and ledge is somewhat less than the
corresponding distance on the connector. This difference provides sufficient
clearance to allow the connector and wall plate to be interlocked together
30 with only a small amount of relative movement thereafter. A tool is
provided for insertion into the grooves to depress the wedge-shaped tabs
when it is desired to withdraw the connector from the wall plate. See also
U.S. 5,041,018.

In the prior art, connectors could only be removed from the rear of the panel. Consequently, wiring work on a prior art patch panel generally has to be carried out behind the panel. This may cause problems because of all the wiring which is disposed behind the panel. Craftspeople
5 working behind the patch panel inadvertently may disarrange wiring or cause disconnections.

Patch panels are available that can be used for optical fiber, for coaxial cable or for copper wiring, but in the marketplace there is not one which can be used for all kinds of connectors. The collar of the plate
10 disclosed in the above-identified U.S. 5,096,437 is fixed to accepting one particular kind of connector.

What is sought after and what seemingly is not available is a patch panel which may include any of several different kinds of connectors. Further, the patch panel should be such that connections may be made
15 from the front of the panel as opposed to the requirement that craftspeople work at the rear of the panel.

Summary of the Invention

The foregoing problems of the prior art patch panel systems have been overcome by the patch panel system of this invention as set forth in
20 the claims.

Brief Description of the Drawing

FIG. 1 is a perspective view of a patch panel system of this invention;

FIG. 2 is a perspective view which depicts a portion of a panel plate, an adapter which becomes disposed in an opening in the panel plate and a connector which is adapted to be mounted in the adapter;
25

FIG. 3 is an enlarged perspective view of the adapter of FIG. 2 showing the adapter secured within the opening in the plate; and

FIG. 4 is a perspective view of a portion of a panel plate, an adapter which becomes disposed in an opening in the panel plate and a collar having a tubular connector assembled thereto.
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Detailed Description

Referring now to FIG. 1, there is shown a patch panel system which is designated generally by the numeral 20. The patch panel system includes a panel plate 22 having a plurality of openings 24-24 formed therein. The patch panel is adapted to be supported so that the plane of the plate is oriented vertically. In each of the openings 24-24 is disposed an adapter, designated generally by the numeral 30 (see also FIG. 2).

The adapter 30 is such that it may be secured to the plate 22 after the adapter has been inserted into the opening. As is seen in FIGS. 2 and 3, the adapter includes two parallel side portions 32-32 each being made of a plastic material. Further, each side portion includes a depending portion 34 at each end thereof. The side portions are spaced sufficiently apart to clear side surfaces 36-36 which define the opening 24.

Two moveable portions such as arms 40-40 are provided. Also, the adapter 30 may be provided with one fixed arm and one moveable arm. Each arm 40 extends between and connected through plastic hinges 42-42 to corresponding ends of the side portions. Each moveable portion 40 includes two detents 44-44 which are spaced apart on an outer surface thereof. Each detent is wedge-shaped and includes a panel-engaging surface 46. Slots 48-48 are provided between each moveable portion and the sidewalls. The detents 44-44 are formed so that the distance between the surface 46 of the detent and an associated depending portion 34 as measured in a direction parallel to the slots 48-48 is slightly greater than the thickness of the panel plate 22.

In FIG. 3 is shown a perspective view of a portion of the panel plate 22 with a portion thereof broken away to show an adapter 30 seated in an opening 24 of the panel plate. As is seen, outer surfaces of the side portions 32-32 engage surfaces 36-36 which define the opening 24. As the adapter is moved into the opening 24, top and bottom surfaces 51 and 52 (see FIG. 2) which, together with the side surfaces 36-36 define the opening 24, ride along the wedge-shaped detents 44-44. This causes forces to be applied to the detents and hence the moveable arms to be cammed inwardly toward each other. The inward movement of the adapter 30 continues until an outer front face of the panel plate engages the depending portions 34 34. When this engagement occurs, the surfaces 46-46 of the detents have just cleared the panel plate and the resiliency of the moveable arms allows the

arms to spring-return to their initial position before insertion. This causes the detents to snap-lock behind the panel plate and to cooperate with the depending portions 34-34 to secure the adapter within the panel plate.

As should be apparent, when it is desired to remove the adapter 30 from the panel plate 22, a craftsperson applies forces to the free end portions of the cantilever arms 40-40 to move the arms toward each other. Such movement is carried out to disengage the detents 44-44 from the rear surface of the panel plate 22 and permit withdrawal of the adapter from the panel plate.

As can best be seen in FIGS. 2 and 3, inner portions of the sidewalls 32-32 also are formed with grooves 55-55, each opening to a front surface 57 of the associated sidewall and each terminating in an inner wall surface 59. The inner wall surface 59 of each groove 55 is spaced from a rear of the associated sidewall by a bridge portion 58.

The grooves 55-55 are adapted to cooperate with portions of connectors which are inserted into the adapter to hold the connector secured to the adapter. For example, as is seen in FIG. 2, a connector includes a jack portion 60 which includes a cavity 62 for receiving a modular plug (not shown). Each sidewall 64 of the jack portion is provided with two spaced tabs 66-66 and a centrally disposed latching finger 68. To secure the connector to the adapter 30, the connector is inserted into an end of the adapter which is opposite to the free ends of the cantilevered arms. Such movement is continued until the bridge portions 58-58 of the sidewalls 32-32 cam the latching fingers 68-68 inwardly to allow the latching fingers to reach the grooves 55-55. As the tabs 66-66 engage a rear surface of the sidewalls 32-32, the latching fingers 68-68 clear the bridge portions 58-58, allowing the resiliency of the latching fingers to cause them to move apart and lock into the grooves 55-55.

In order to mount a connector in the patch panel, a craftsperson pulls the connector, for example the connector 60, through the opening 24 in which it is desired to mount it and assembles the connector to an adapter 30 as described hereinabove. Then the craftsperson moves the assembly of the connector and the adapter rearwardly into the opening 24. As the adapter 30 is moved into the opening, the surfaces 51 and 52 are effective to cam the detents and arms inwardly. Movement of the connector 60 and the adapter 30 is continued until the depending portions 34-34 engage the panel

plate 22. At that time, the surfaces 46-46 clear the panel plate allowing the arms to move resiliently outwardly from each other. The detents 44-44 cooperate with the depending portions 34-34 to secure the adapter and hence the connector to the panel plate. Of course, the craftsperson could
5 depress the arms 40-40 during the insertion process, but this is not necessary.

In an alternative manner of mounting connectors in the panel plate 22, a craftsperson may insert an adapter 30 into each opening 24 and cause the adapters to be secured to the panel plate. Then a connector is
10 caused to be mounted in each selected adapter.

It should be observed that after a connector has been assembled to an adapter, movement of the arms 40-40 inwardly toward each other is restricted. This prevents excess movement and possible overstressing of the arms.

Should it become desirable or necessary to rearrange connectors, a craftsperson depresses the arms 40-40 of the adapter in which the connector to be moved is mounted and moves the adapter forward out of the opening in the panel plate. During the demounting of the adapter from the panel plate, the connector such as the connector 60, for example, is still
15 secured to the adapter. Then the craftsperson disassembles the connector from the adapter and moves it rearwardly through the opening and then laterally to the new desired location whereat it is brought forward through the opening at the new location and secured to an adapter after which the adapter is mounted in the panel plate at the new desired location.
20

In another method of removing connectors from the patch panel, a craftsperson may remove the connector from the rear of the panel plate, leaving the associated adapter mounted in the panel plate. Of course, it seems more advantageous to work on connections from the front of the panel plate, particularly if it is desired to perform work only on one
25 connector.
30

The removal of a connector 60 from an adapter 30 is facilitated by a tool 70. See FIG. 2. The tool 70 is U-shaped and includes two side beams 72-72 each having a wedge-shaped free end 74. In order to remove the connector 60 from its associated adapter, the tool 70 is oriented so that
35 the wedge-shaped ends 74-74 are aligned with the grooves 55-55. The tool 70 is moved toward the connector to cause the wedge-shaped ends 74-74 to

become disposed between the latching fingers 68-68 and the grooves 55-55. This causes the latching fingers to be depressed and further inward movement of the tool 70 causes the connector 60 to be moved rearwardly out of engagement with the adapter 30. Afterwards, the tool may be stored
5 on the connector 60 where it also may be used to cause insertion of conductors into slots of metallic contact elements. The tool 70 and its association with a connector are disclosed in previously mentioned U.S. 5,096,439 which is incorporated by reference hereinto.

10 In order to prevent dust from the portion of a room in front of the panel plate from entering the opening of the adapter 30 and moving into contact with adjacent connections at the rear of the connector, a dust cover (not shown) is assembled to the adapter. The dust cover which also is disclosed in U.S. 5,096,439, includes side legs which are received in grooves 55-55 of the adapter.

15 Of course, it should be realized that other kinds of arrangements may be used to secure a connector to the adapter. What is important is that each connector to be used with an adapter has facilities which cooperate with portions of the adapter to cause the connector to be secured releasably to the adapter.

20 The adapter 30 may have any one of plurality of collars mounted therein. Each collar is designed to be associated with a particular connector. Therefore when it is desired to present a particular connector in a panel plate, a collar associated with that connector is inserted into the adapter and the connector is assembled to the collar.

25 A connector 60 which includes a modular jack with split beam contacts, causing electrical connections to be made with the jack wires has been described earlier herein. Collars must be available for use with cylindrically shaped connectors such as coaxial connectors and AT&T's ST® connector. See U.S. patent 4,934,785.

30 One collar 80 (see FIG. 4) is cup-shaped and includes a front wall 82 having an opening 83 therein for receiving a tubular connector 84. Extending from the front wall are sidewalls 86-86 and top and bottom walls 88-88. Each sidewall 86 includes side portions 89 and 91 which are adjacent to the top and bottom walls 88-88 and which have depending portions 92
35 and 93 at free ends thereof. The side portions 89 and 91 are separated from a center portion 94 by slots 95 and 96. Further, on the outer surface of the

center portion 94 is disposed a wedge-shaped detent 97 and a release member 98. The release member 98 is oriented toward one of the side portions and the detent 97 toward the other side portion.

5 A tubular connector is inserted through the opening 83 in the front wall of a collar and secured therein. Then the collar 80 is oriented as shown in FIG. 4 so that the center portion of each sidewall is aligned with one of the grooves 55 in the adapter. The collar is moved toward the rear of the adapter which causes the detents 97-97 to be cammed inwardly by the bridge portions 58-58 of the adapter. This causes the center portions 94-94
10 to be depressed, allowing further movement of the collar until the depending portions 92 and 93 engage the rear surface of the side portions 32-32 of the adapter. At that time, each wedge-shaped detent 97 has cleared a bridge portion 58 of the adapter, allowing the center portions to be moved resiliently outwardly to capture each adapter sidewall between
15 the wedge-shaped detent 97 and the depending portions 92 and 93. The distance measured in a direction along the slots 95 and 96 between the detent 97 and the depending portions 92 and 93 is slightly greater than the distance between the groove 55 of the adapter and a rear face of a bridge portion 58.

20 The collar is removable separately from the adapter 30 or it may be separated together with the adapter 30 from the panel plate. In order to disassemble the collar from the adapter, a craftsperson causes forces to be applied to the release members and toward each other. Such forces cause the center portions 94 to be moved toward each other and hence cause the
25 detents 97-97 to be disengaged from the adapter grooves 55-55, thereby allowing withdrawal of the connector from the adapter.

The claims defining the invention are as follows:

1. A device which is capable of being mounted in an opening in a panel, and which is adapted to hold a component, said device comprising two parallel side portions each being made of a plastics material, each side portion being provided with
5 two depending portions which depend from opposite ends of the respective side portion, two moveable portions, each extending between corresponding ends of said side portions and being hingedly connected thereto and each being biased resiliently outwardly, each moveable portion including two detents projecting from an outer
10 surface of said moveable portion such that when forces are caused to be applied to free end portions of said moveable portions to cause the free end portions to be moved toward each other, the device is capable of being inserted from a front surface of the panel into said opening in said panel until the front surface of the panel abuts the depending portions of the side portions whereupon the application of said forces is discontinued to allow the moveable portions to move outwardly and cause said detents
15 to snap-lock into engagement with a rear surface of the panel on the opposite side of the panel to the free end portions.

2. The device of claim 1, wherein each of said detents is wedge-shaped with the portion thereof having the least thickness being oriented toward that portion of the device which is first inserted into the opening in the panel.

3. The device of claim 2, wherein both said moveable portions are biased outwardly to cause said detents to abut opposed surfaces which define the opening into which the device is inserted.

4. The device of claim 3, wherein when the front surface of said panel engages said depending portions and when said device is fully inserted, the
25 discontinuation of the application of forces to said moveable portions allows said moveable portions to move outwardly and cause end faces of said detents, which end faces are adjacent to the depending portions of the side portions, to engage an opposite surface of said panel.

5. A connection assembly comprising the device of claim 4, wherein
30 each of said side portions includes an inwardly facing surface which is provided with a groove which extends from a front end portion of said device toward an opposite end portion of said side portion, and a modular jack which is adapted to become disposed in an opening formed by said side portions and which is provided with depressible detents on opposite sides of the modular jack, each of the detents having associated therewith
35 two spaced, collinear projections so that when the modular jack is inserted into the opening in said device, the detents are depressed toward each other and ride over bridge portions of said side portions until the projections abut an outer surface of said side portion whereupon each depressible detent is aligned with the groove on the



associated side portion and is biased outwardly to cause the detents to snap-lock into said grooves of said side portions.

6. A patch panel which comprises a panel plate having an array of openings formed therein; and an adapter which is mounted in an opening in the panel plate, and which is adapted to hold a component, said adapter comprising two parallel side portions each being made of a plastic material, each side portion being provided with two depending portions which depend from opposite ends of the respective side portion,

two moveable arm portions, each extending between corresponding ends of said side portions and being hingedly connected thereto and each being biased resiliently outwardly, each moveable arm portion including two detents projecting from an outer surface of said moveable arm portion such that when forces are caused to be applied to free end portions of said moveable arm portions to cause the free end portions to be moved toward each other, the adapter is capable of being inserted from a front surface of the panel plate into one of said openings in said panel plate until the front surface of the panel plate abuts the depending portions of the side portions whereupon the application of said forces is discontinued to allow the moveable arm portions to move outwardly and cause said detents to snap-lock into engagement with a rear surface of the panel plate on the opposite side of the panel plate to the free end portions to hold said adapter mounted within said one of the openings in the panel plate.

7. The patch panel of claim 6, wherein each of said detents is wedge-shaped with the portion thereof having the least thickness being oriented toward that portion of the adapter which is first inserted into the opening in the panel plate.

8. The patch panel of claim 7, wherein said moveable arm portions are biased outwardly sufficiently to require their relative movement toward each other to withdraw said adapter from said panel plate.

9. The patch panel of claim 8, wherein the distance between a plane which extends through inner surfaces of the depending portions which engage the panel plate and a plane through those end faces of the wedge-shaped detents which are adjacent to the inner surfaces of the depending portions of the side portions is slightly greater than the thickness of the panel plate.

10. The patch panel of claim 6, which also includes a collar which is capable of being assembled to said adapter and which is capable of having a tubular connector assembled thereto, said collar including a front wall and top and bottom walls extending perpendicularly from said front wall and two sidewalls extended inwardly from said front wall, said front wall including an opening for receiving an optical fiber connector, each said sidewall including means for causing said collar to be secured.



11. A panel adapter substantially as hereinbefore described with reference to the accompanying drawings.

12. A connection assembly comprising a panel adapter and a jack, and being substantially as hereinbefore described with reference to the accompanying
5 drawings.

13. A patch panel comprising a panel plate and an adapter adapted to be mounted in an opening defined by the panel plate, the patch panel being substantially as hereinbefore described with reference to the accompanying drawings.

DATED this Twelfth Day of December 1994
American Telephone & Telegraph Company

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Patent Attorneys for the Applicant
SPRUSON & FERGUSON

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UNIVERSAL PATCH PANEL FOR COMMUNICATIONS USE IN BUILDINGS

Abstract

A patch panel which includes an array of connectors includes a
5 panel plate (22) having an array of openings (24,24) formed therein. Each
opening is capable of receiving an adapter (30) which may be made of a
plastic material and which includes opposed depressible cantilevered beams.
Each adapter on opposed top and bottom surfaces of the arms includes two
wedge-shaped tabs which cooperate with depending portions of sidewalls of
10 the adapter to secure the adapter to the panel plate. Opposed grooves
(55,55) open to internal sidewall surfaces and terminate in bridge portions
(58,58) adjacent to a rear of the adapter. Each groove is adapted to receive
a resilient tab (68) formed in a sidewall of a connector (60) or detent
member (97) of a collar (80) to be received in the adapter. When the
15 connector or collar is seated fully in the adapter, the resilient tab or detent
engages a forward surface of the bridging portion and collinear strips also
formed on each sidewall of the connector or depending portions of the collar
engage a rear surface of the bridging portion to secure the connector or the
collar to the adapter. This arrangement allows any one of different types of
20 connectors to be secured to the patch panel by securing the connector to an
adapter which is secured to the panel plate. Rearrangements are made
easily and may be made from the front or rear of the panel plate.

Figure 4

FIG. 1

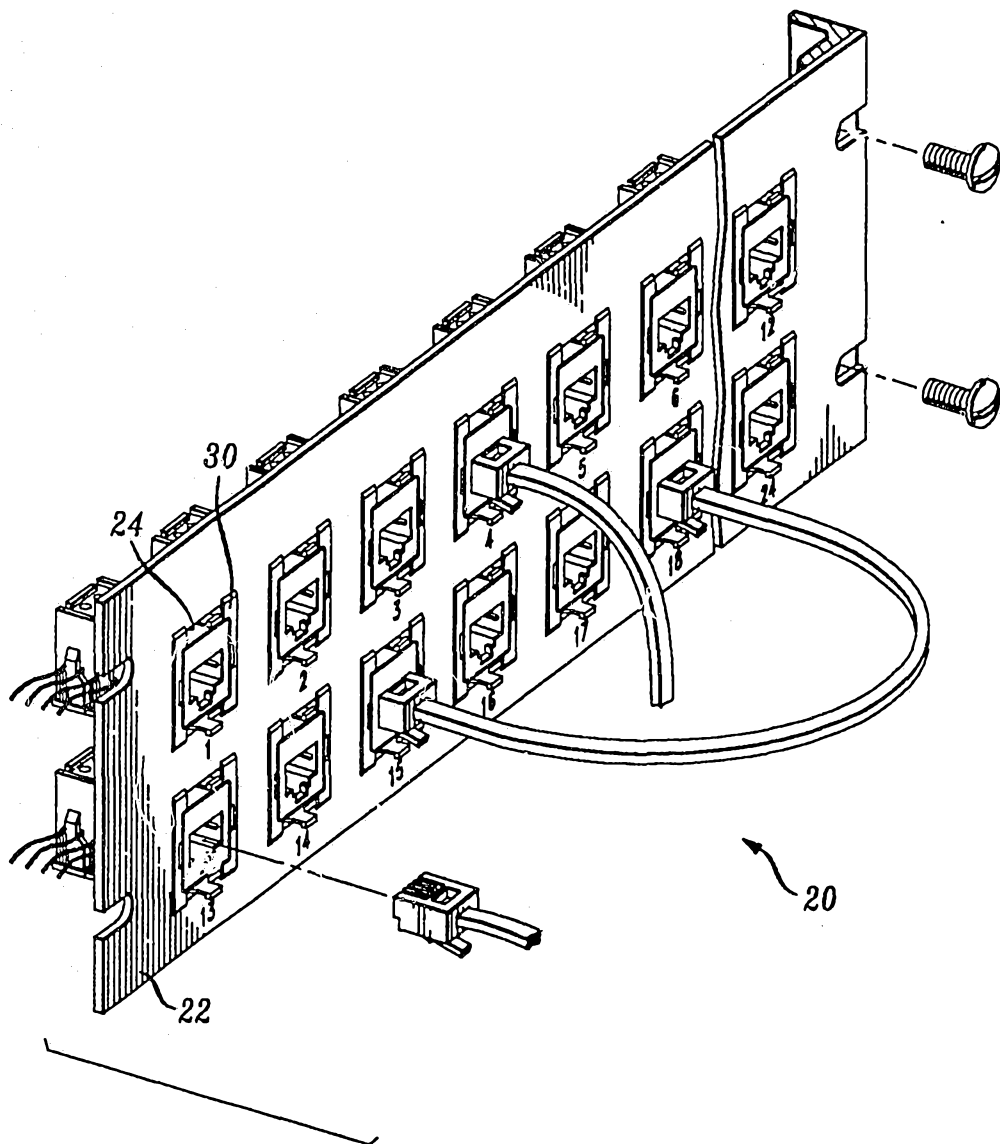


FIG. 2

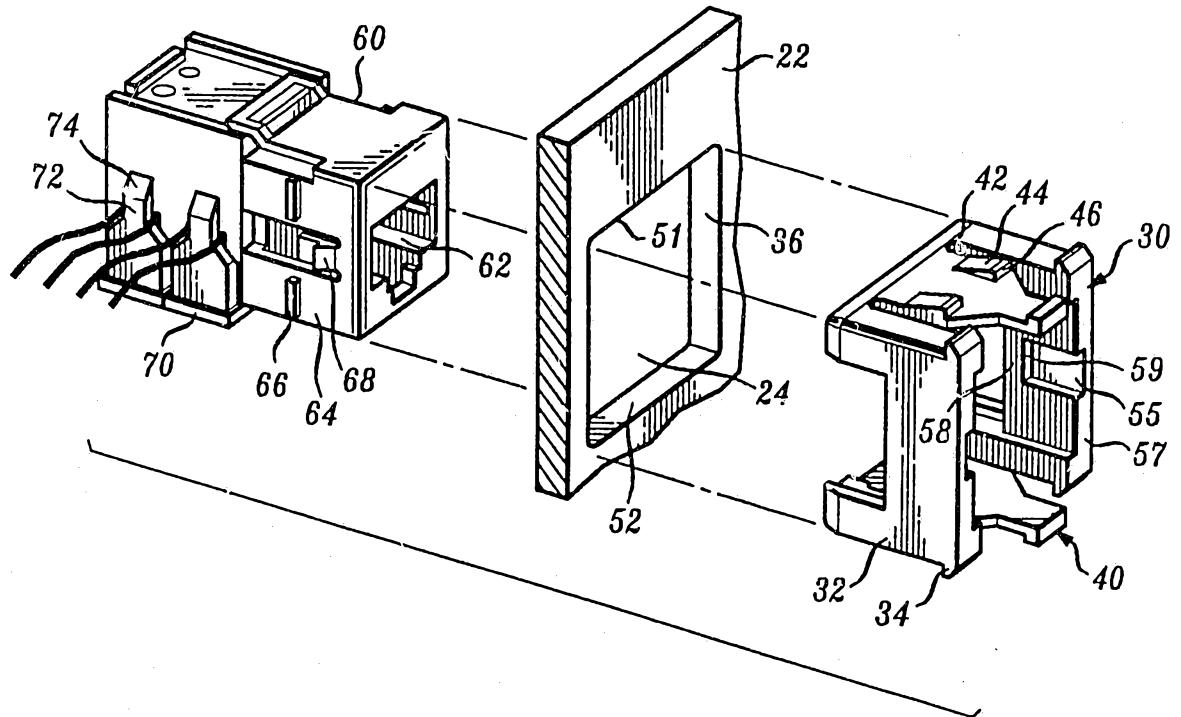


FIG. 3

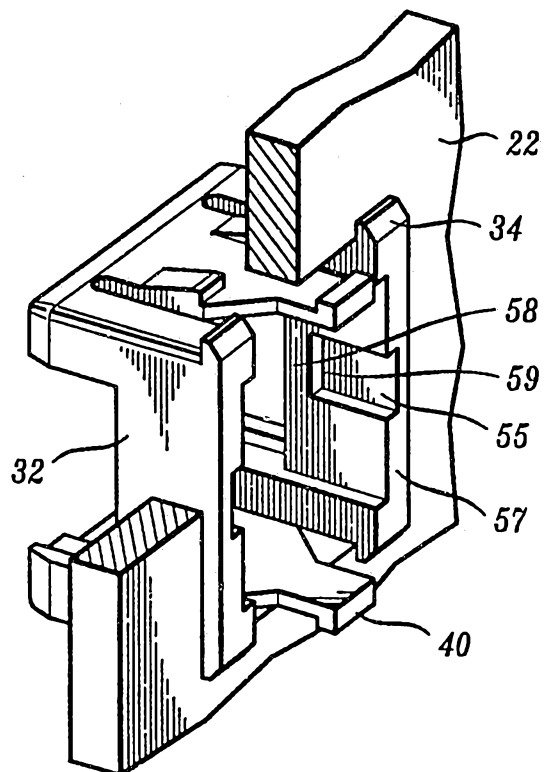


FIG. 4

