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(56) Documents Cited:
GB 2415549 A
WO 1999/063628 A1
US 20050197005 A1
WO 2005/083849 A1
US 5530954 A

(58) Field of Search:
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(54) Abstract Title: **Patch panel having angled jacks**

(57) A patch panel with a planar front plate 3 on which jacks 11 are mounted in two or more rows 5, 7, across the plate; at least the central jacks of each row are angled at less than 90 degrees, preferable 45 degrees, to the plate towards one end side of the panel and the jacks on the other side of each row are angled in the opposite direction. Preferably the jacks in adjacent rows are staggered. A rack of patch panels may be provided with patch cord cable managers provided at each side. The angled jacks provide compact cabling arrangement requiring less space in front of the patch panel.

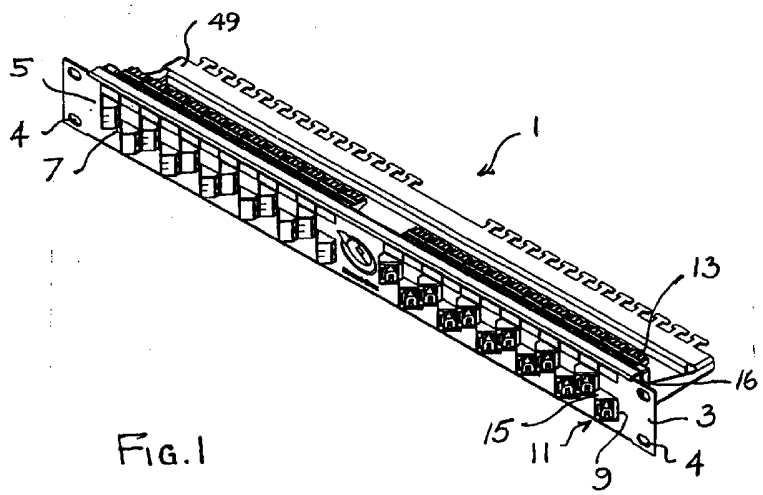

FIG.1

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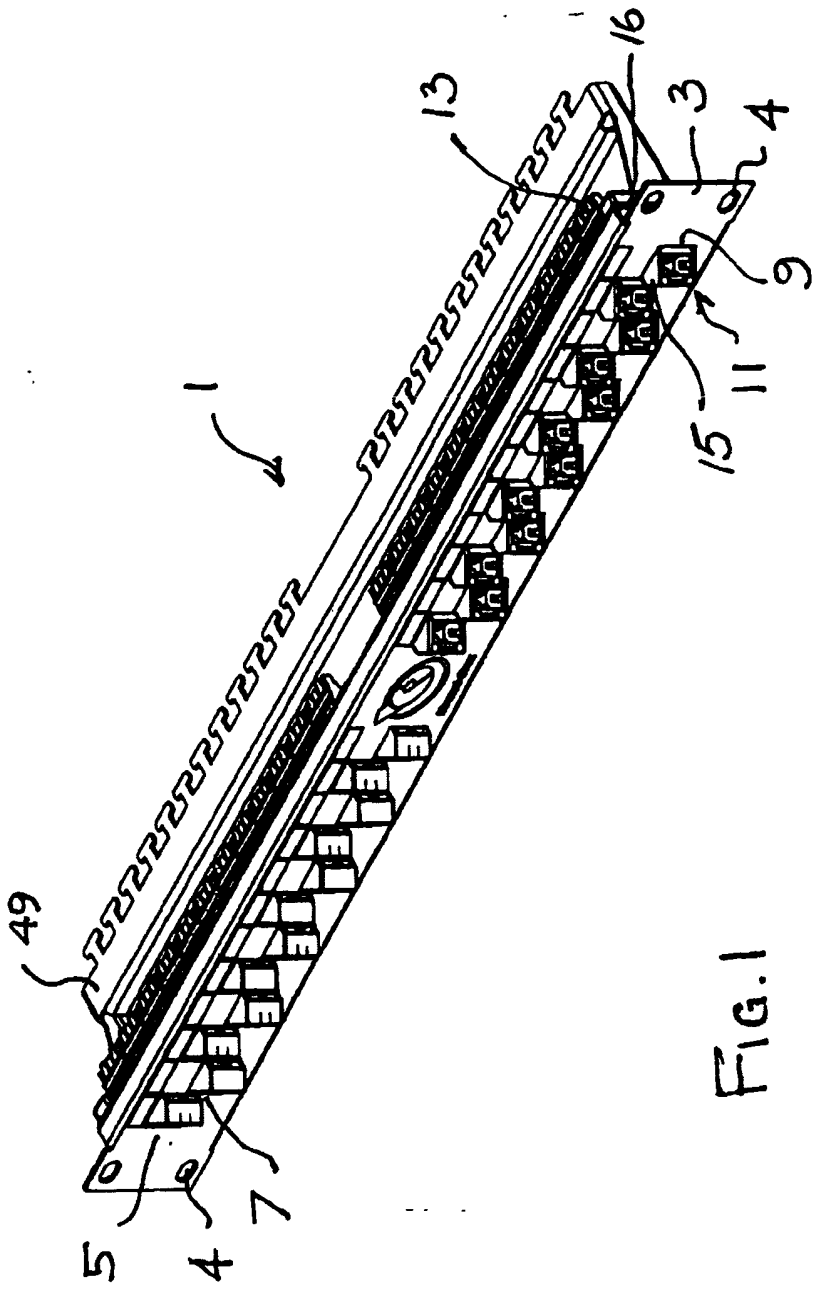
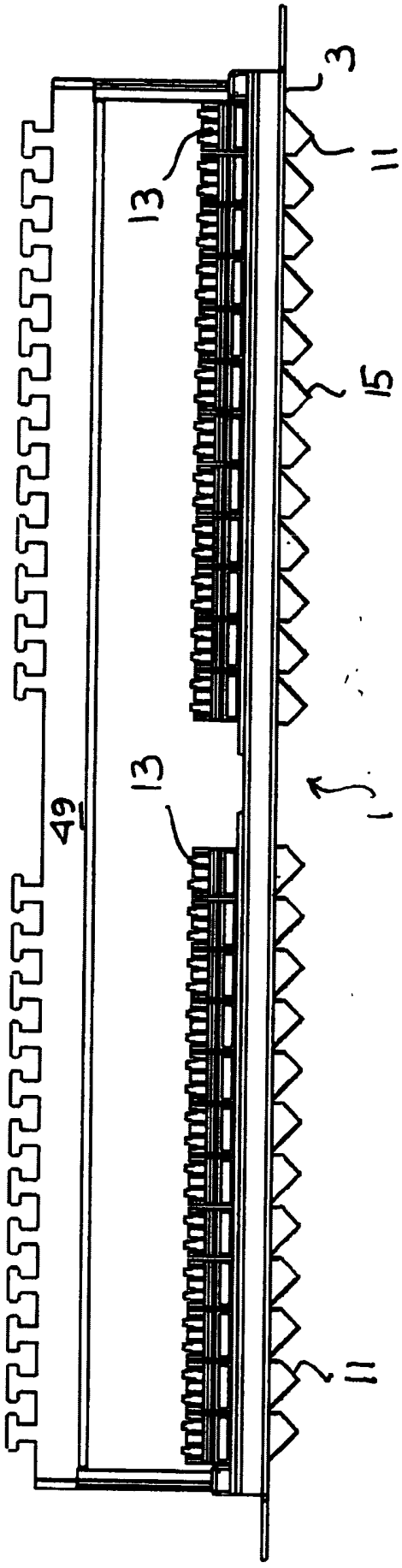


FIG. 1

FIG. 2



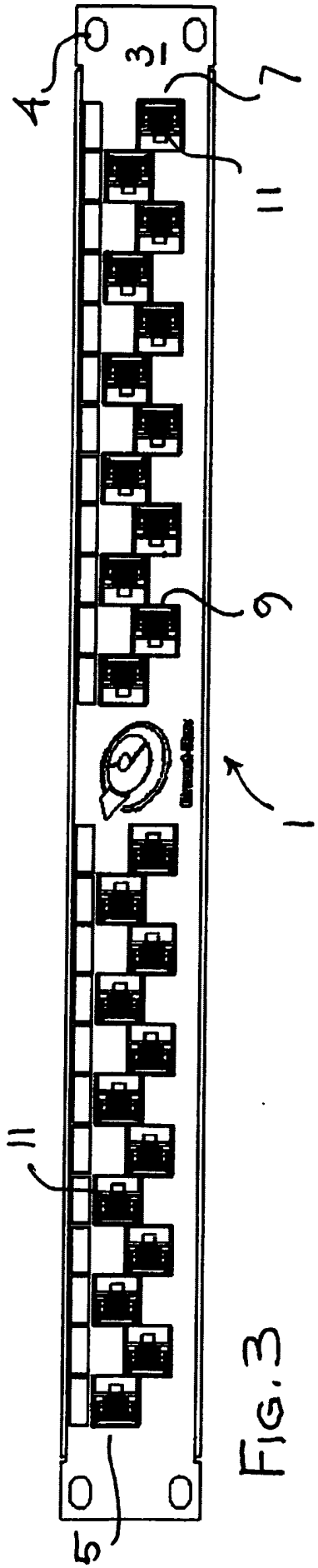


FIG. 3

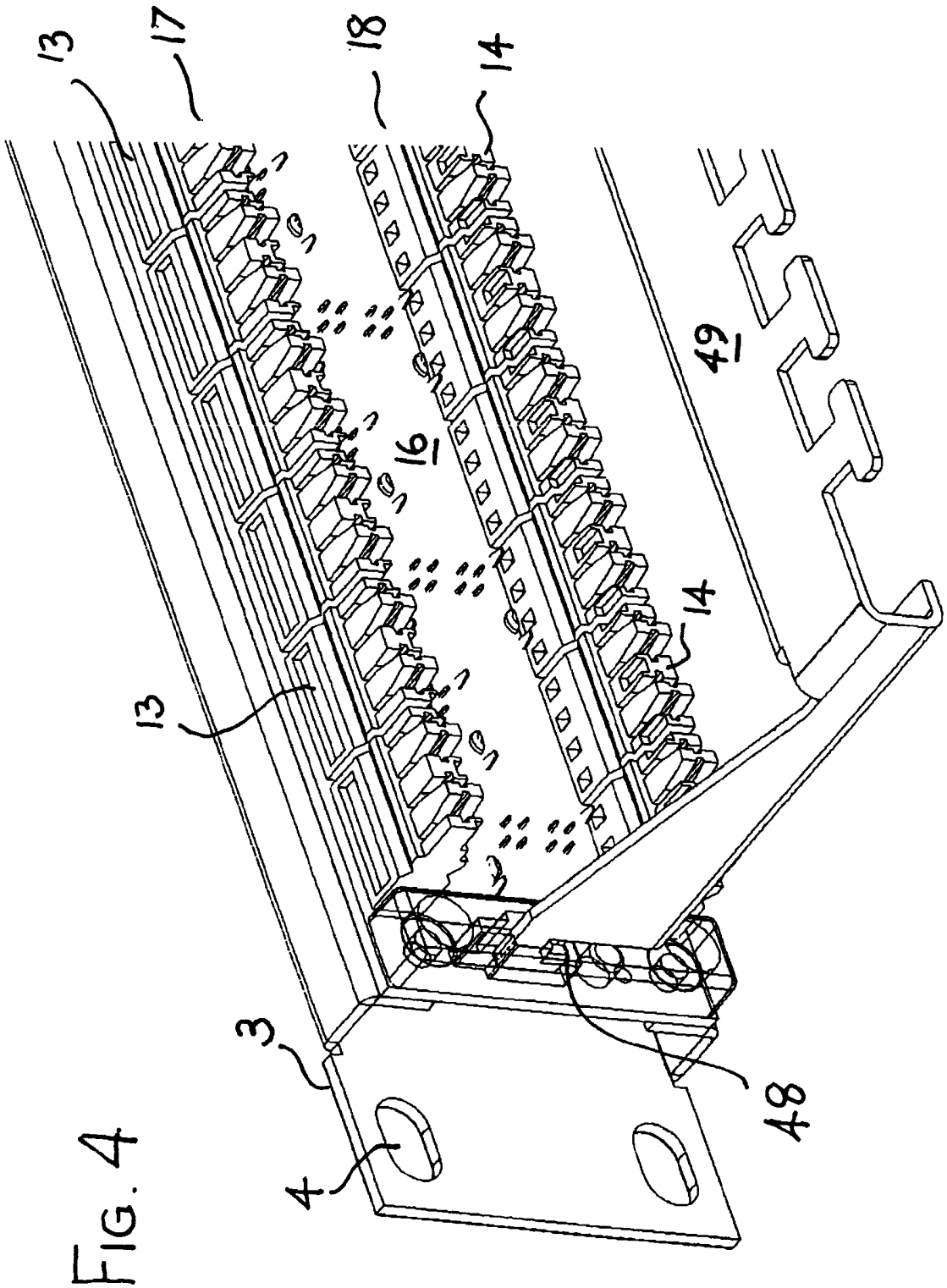
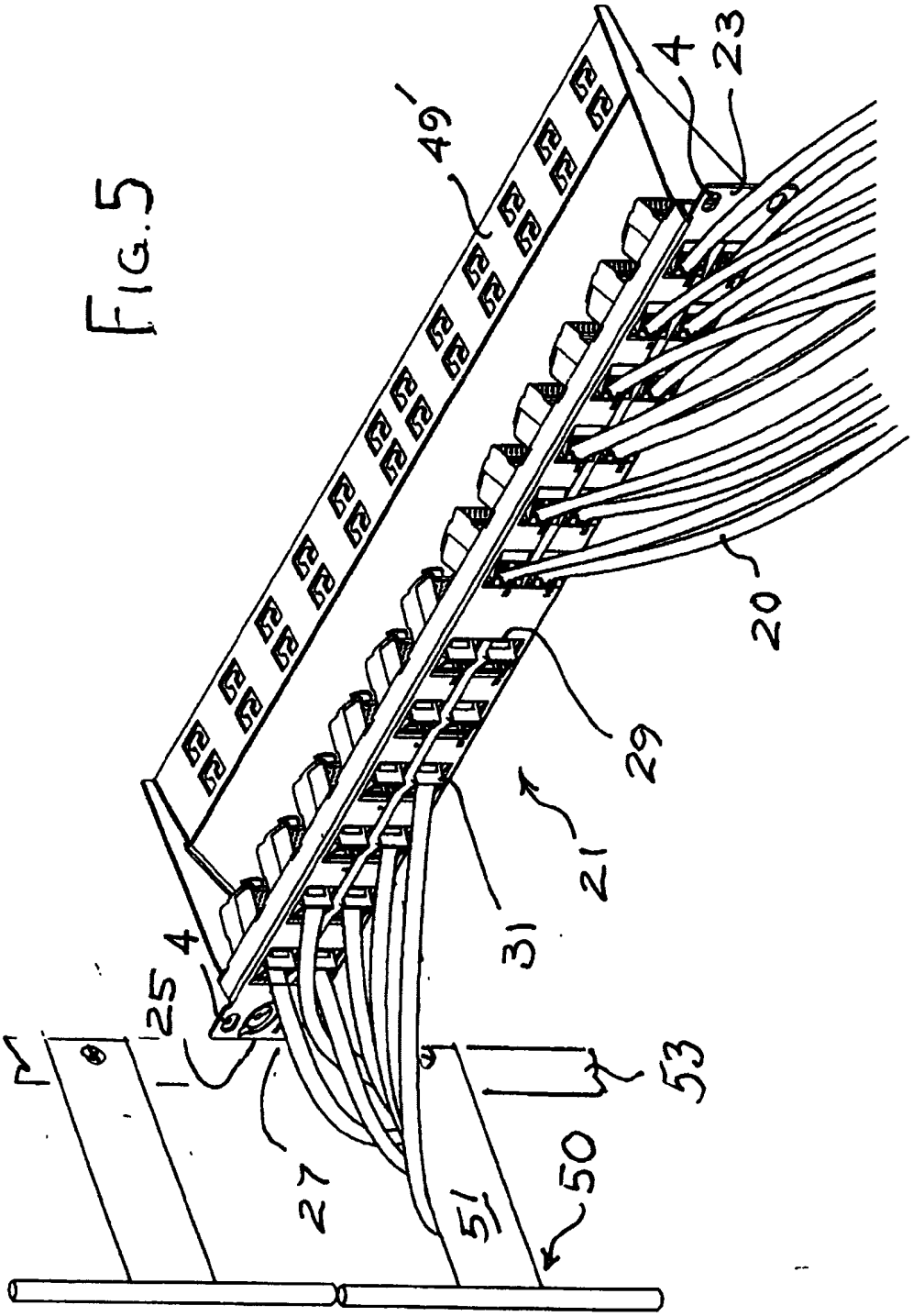


FIG. 4

FIG. 5



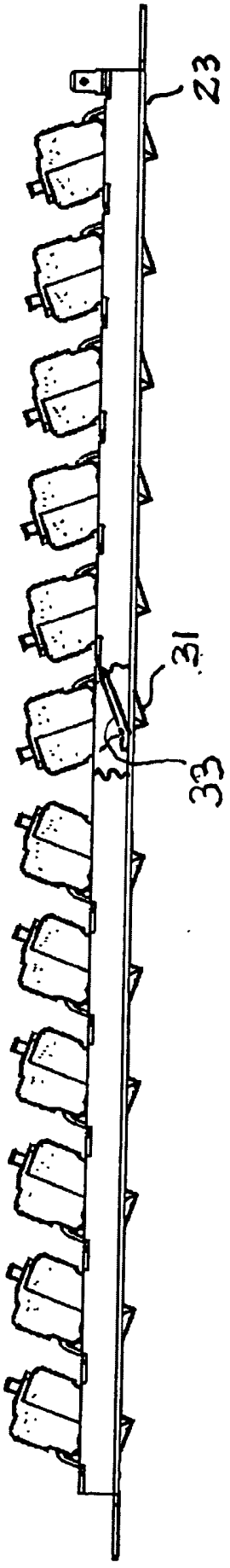


FIG. 6

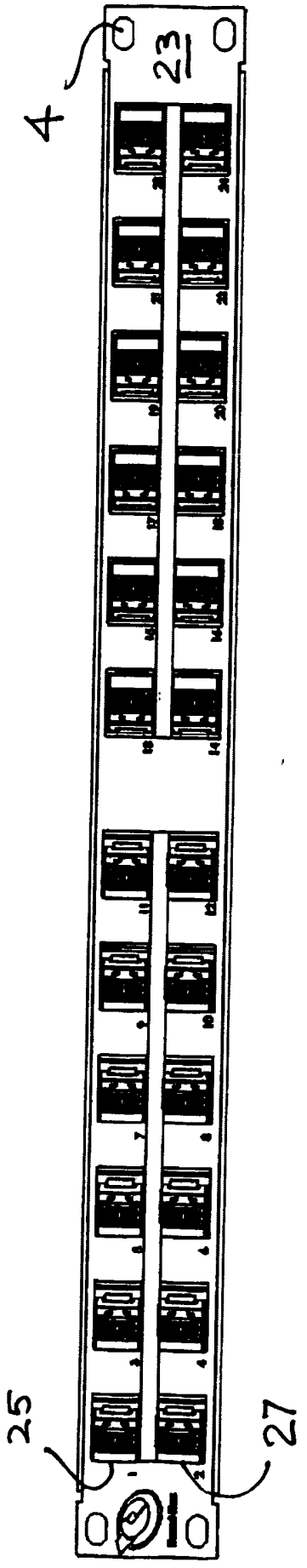


FIG. 7

PATCH PANELS

The present invention relates to patch panels for telecommunication patching racks and cabinets and to the racks themselves.

Conventional patching racks have nineteen inch (483mm) panels with twenty-four sockets known as jacks arranged side by side in a horizontal row. A cabinet has many such panels stretched one above another. The cords each have a jack plug on each end which plugs horizontally into a chosen jack so that the plug axis is at right angles to the panel. The cabinets conventionally have doors often a short distance from the front of the panel so that the cord as it leaves the plug tends to have to bend sharply over to pass up or down to plug its other end into another jack. Again, the bend is often sharp. Consequently the cords are stressed at each end. Furthermore, the resultant apparent effect of many cords all going in different directions is untidy and may be difficult to follow when repatching.

Accordingly, the invention provides a patch panel having a substantially planar front plate and a plurality of jacks arranged in one or more rows across the plate, at least the central jacks of the or each row being angled at less than 90° to the plate towards one end side of the panel on one side of the or each row and forwards the other end side of the or each row on the other side of the or each row.

Preferably the jacks on one side of the middle of the panel point in one direction and on the other side in another direction, preferably at the same angle to the front face of the front plate, the sides being defined by the centre and end sides of the panel so that half of the jacks point in one direction away from the centre and half of the jacks point in the other direction away from the centre.

As a result of the configuration of the jacks on the panel

of the invention, the patch cords can be let neatly towards each end side of the panel and as required collected at each side without any sharp bends and without resulting stress into vertical cable management devices. This not only reduces the stress at the junction between cord and plug but requires less space in front of the panel than that of conventional panels. A further advantage is that the visual indicator at each jack is more easily seen.

Whilst it is known to have single or perhaps even double jacks in for instance floor boxes, the purpose is merely to direct a connection cable through a cable outlet. Thus even if two jacks are provided, they both point in the same direction. In the present case, the arrangement of jacks pointing in the opposite direction away from the centre results in the aforesaid advantages.

Examples of the invention will now be described with reference to the accompanying drawings in which:-

Figure 1 is a perspective view of a PCB based panel according to a first embodiment of the invention;

Figure 2 is a plan view of the panel of Figure 1;

Figure 3 is an elevation of the front of the panel of Figure 1;

Figure 4 shows part of the back of the panel of Figure 1;

Figure 5 is a perspective view of a snap-in jack panel according to a second embodiment of which also shows how patch cords are diverted sideways;

Figure 6 is a plan view of the panel of Figure 5;

and Figure 7 is an elevation of the panel of Figure 5.

Referring to the first embodiment shown in Figures 1 to 4, panel 1 has a front plate 3 which has two rows 5 and 7 of apertures 9 into which jacks 11 are mounted. Each jack 11 has two identical rear terminal blocks 13 and 14, each of which has four terminals for two pairs of twisted wire conductors. These blocks 13 and 14 are best shown in Figure 4. The splitting of the blocks into an upper row 17 and lower row 18 enables the twisted wire conductors (not shown) to be more easily connected. The split arrangement also facilitates the mounting of the front socket parts 15 of the jacks 11. The terminal blocks 13 and 14 are mounted directly on a PCB (printed circuit board) strip 16 which extends across the front plate 3. The front 15 of each jack is also mounted on the PCB strip 16 and is electrically connected to terminals in the terminal blocks 13 and 14 through the PCB strip 16. Twelve of the same parts 15 are mounted on the strip 16 facing 45° to the left and twelve parts 15 are mounted on the strip 16 facing 45° to the right.

Because the jacks 11 are essentially unscreened, the staggering of rows 5 and 7 and alternatively reversed connections at the rear to the terminal blocks, there is an important beneficial effect in reducing cross talk. Furthermore, staggering also helps to keep the patch cords tidy, assists in plugging into the jacks and maximises rack density. The direction of patch cords sideways to the left and right eliminates the need for horizontal cable management which in turn makes port identification easier. A further advantage of the sideways directing of the cords is that it eases bending stresses on the cord while maximising performance.

Rear cable management ensuring strain relief is provided by bracketed out castellated element 49 which hooks into a slot 48 at the rear of front face 3.

A second embodiment is shown in Figure 5 which also shows

how the patch cords 20 are managed.

The second embodiment shown generally at 21 has a front plate 23 which again has an upper 25 and lower 27 row of apertures 29 into which canned jacks 31 are snap fitted. The jacks are mounted into plate 23 as in the first embodiment so that twelve jacks face to the left and twelve to the right. Due to the canning arrangement, the mounting angle, in this case between 60° and 80° (e.g. about 70°) is different to that of the first embodiment and consists of a backing plate 33 (see Figure 6 where the drawing is broken away) welded to the rear of the front plate 23 which is made of steel. Because of the mounting arrangements, the second embodiment does not have the same staggered arrangement of the first embodiment.

A rear cable management bracketed element 49' is attachable to the rear of front plate 23 to provide strain relief as in the first embodiment.

Both embodiments have the usual standard arrangement of screwing into racks with holes in the front plates 3 and 23 being 19 inches (483mm) apart horizontally. Also secured to the racks are cable managers 50 which are aligned vertically on each side of the racks. Horizontal elements 51 on the managers provide supports either side of the panels for the patch cords 20. These also retain the bundles of cords 20 in their angled and distressed condition. The fixture of the cable managers 50 to the racks 53 may be simply by screwing elements 51 to vertical parts of the racks.

It will be appreciated that the arrangement of angling the jacks in both embodiments increases rack density as compared to conventional panels because space does not have to be provided between panels for horizontal cord management. Advantages of single row panels are not as great as those in the double row panels but still have the advantage of angled separation left and right. It is therefore within the scope

of the invention to provide a panel with only a single row.

In the most extreme case where very high patch density is required in a connectivity rack, the panels of the invention can provide double the density of connections as a configuration which uses conventional panels and cable managers.

Conventionally, 720 jacks would be provided. In a rack using the invention, this provides for up to 1128 jacks. This calculation is based on the use of a 47U rack with the combination of two panels and one cable manager every 3U.

CLAIMS

1. A patch panel having a substantially planar front plate and a plurality of jacks arranged in one or more rows across the plate, at least the central jacks of the or each row being angled at less than 90° to the plate towards one end side of the panel on one side of the or each row and towards the other side of the or each row.

2. A panel as claimed in claim 1 wherein the jacks are angled away from each other from the centre of the panel.

3. A panel as claimed in claim 1 or 2 wherein the jacks are angled at the same angle to the front plate.

4. A panel as claimed in any one of claims 1 to 3 wherein there are two horizontal rows of jacks mounted to the front plate.

5. A panel as claimed in anyone of claims 1 to 4 wherein apertures are provided in the front plate for mounting the jacks.

6. A panel as claimed in claim 4 and 5 when dependent on claim 4 wherein the apertures in one row are vertically above the other row.

7. A panel as claimed in claim 4 and 5 when dependent on claim 4 wherein the apertures in one row are in a staggered relationship to the apertures in the other row.

8. A panel as claimed in claim 7 wherein each jack has a pair of terminal blocks secured at the rear of the panel, one block being above the other.

9. A panel as claimed in any of the preceding claims wherein the jacks are angled at substantially 45° to the

plane of the front plate.

10. A panel as claimed in any of claims 1 to 8 wherein the jacks are angled at between 60° and 80° to the plane of the front plate.

11. A rack of panels of any of the preceding claims.

12. A rack as claimed in claim 1 wherein patch cord managers are provided at each side of the rack, each manager having a substantially horizontal part arranged to carry patch cords going to or from the jacks.

13. A patch panel substantially as described with reference to and as shown in the accompanying drawings.

14. A patch panel rack substantially as described and as shown in Figure 5 of the accompanying drawings.

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Application No:	GB0715833.0	**Examiner:**	Ben Munns
Claims searched:	1-14	**Date of search:**	22 November 2007

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-6, 9-12	US 2005/0197005 A1 (BENTLEY) see the figures, frame 102 having planar front face, abstract and paragraphs 4-7, 15, 17, 19 and 21.
X,Y	X.1-6, 9-11; Y:7, 8	GB 2415549 A (ADC TELECOMMUNICATIONS) see the figures and page 3 line 4.
X	1-6, 9-12	US 5530954 A (LARSON ET AL) see the figures, planar front plate 42, col.1 lines 25-32 and 43-53. and col.2 line 65 to col.3 line 29.
X	1-3, 5, 9-11	WO 99/63628 A1 (ADC TELECOMMUNICATIONS) see especially figure 1, frame 34 having planar front face 36, page 1 line 34 to page 2 line 24 and page 4 lines 14-15.
Y	7, 8	WO 2005/083849 A1 (ADC INC) see particularly figures 19D & 21A-D, and paragraphs 4, 5, 8, 117, 127-129 and 138-141.

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC[X] :

Worldwide search of patent documents classified in the following areas of the IPC

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI

International Classification:

Subclass	Subgroup	Valid From

Subclass	Subgroup	Valid From
H04Q	0001/14	01/01/2006
H01R	0013/518	01/01/2006