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División de Nuevas Creaciones
E. S. D.

Ref: EXPEDIENTE Nº 00009266
Solicitud de patente a nombre de
ADC TELECOMMUNICATIONS, INC

Sin perjuicio del plazo pedido con mi memorial del 4 de abril último, me permito adjuntar la copia certificada de la solicitud de patente norteamericana Nº 09/249.718 del 12 de febrero de 1999 de la cual se reclama prioridad, oficialmente traducida en sus apartes principales y reivindicaciones.

Atentamente,

MARCELA CASTILLO TORRES
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Oficina de Marcas y Patentes de los Estados Unidos,

28 de febrero de 2000

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NUMERO DE SOLICITUD: 09/249.718

FECHA DE REGISTRO: 12 de febrero de 1999

Por el Comisionado de Marcas y Patentes,

(Firma ilegible) T. LAWRENCE, funcionario de certificaciones

Sello dorado en relieve y superpuesto de la Oficina de Marcas y Patentes de los Estados Unidos de América.

[...] **TÍTULO: SOPORTE PARA EL MANEJO DE CABLES EN EQUIPOS DE TELECOMUNICACIONES**

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[...] **REIVINDICACIONES**

1. Un soporte para montar regletas de telecomunicaciones, cada una de ellas adaptada para recibir módulos conectados en cruz, el cual comprende:

un marco que define un compartimento formado entre dos paredes laterales, verticales y separadas, de dimensiones aptas para recibir las regletas de telecomunicaciones; y

una estructura para el manejo de cables que está unida al marco y que define un primer canal vertical y un segundo canal vertical separados, los cuales comprenden, respectivamente, una primera área de paso de dimensiones aptas para recibir una pluralidad de cables conectados en cruz provenientes de las regletas de telecomunicaciones, y una segunda área de paso de dimensiones aptas para recibir los cables de energía y de tierra provenientes de las regletas de telecomunicaciones, siendo esta segunda área de paso considerablemente más pequeña que la primera área de paso.

2. El soporte descrito en la reivindicación 1, en el cual la estructura para el manejo de cables incluye una pluralidad de estructuras anulares separadas que van unidas al marco, cada una de las cuales comprende una primera abertura de dimensiones aptas para recibir la pluralidad de cables conectados en cruz y una segunda abertura de dimensiones aptas para recibir los

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cables de energía y de tierra, estando estas estructuras anulares montadas sobre el marco de tal manera que las primeras aberturas quedan alineadas a lo largo de un primer eje vertical para formar el primer canal vertical, y que las segundas aberturas quedan alineadas a lo largo de un segundo eje vertical para formar el segundo canal vertical.

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3. El soporte descrito en la reivindicación 2, en el cual cada estructura anular incluye: una placa de base; un primer grupo de elementos anulares que sobresalen de la placa de base y definen por lo menos parcialmente la primera abertura; un segundo grupo de elementos anulares que sobresalen de la placa de base y definen por lo menos parcialmente la segunda abertura.

4. El soporte descrito en la reivindicación 3, en el cual el primer grupo de elementos anulares está compuesto por dos elementos enfrentados, primero y segundo, cuyos extremos están doblados y se extienden el uno hacia el otro, y en el cual el segundo grupo de elementos anulares está compuesto por elementos en forma de L espaciados verticalmente.

5. El soporte descrito en la reivindicación 4, en el cual el segundo elemento enfrentado está colocado entre el primer elemento enfrentado y los elementos en forma de L, y en el cual los elementos en forma de L tienen extremos libres que terminan adyacentes al segundo elemento enfrentado.

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6. El soporte descrito en la reivindicación 5, en el cual el primer elemento enfrentado tiene una primera región cortada que permite el acceso de los cables a la primera abertura, y en el cual esta región cortada está alineada en general con el segundo elemento enfrentado.

7. El soporte descrito en la reivindicación 6, en el cual la placa de base define por lo menos una muesca para permitir el paso de los cables de entrada y salida a través de la placa de base.

8. Una estructura anular para el manejo de cables destinada a equipos de telecomunicaciones, la cual comprende:

una base adaptada para ser conectada a un soporte de telecomunicaciones de conexiones en cruz;

un primer anillo que sobresale de la placa de base y define por lo menos parcialmente una primera abertura de dimensiones aptas para recibir una pluralidad de cables conectados en cruz;

un segundo anillo que sobresale de la placa de base y define por lo menos parcialmente una segunda abertura de dimensiones aptas para recibir los cables de energía y de tierra, estando la segunda abertura separada de la primera abertura.

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9. La estructura anular descrita en la reivindicación 8, en la cual el primer anillo está compuesto por dos elementos enfrentados, primero y segundo, cuyos extremos están doblados y se extienden el uno hacia el otro, y en la cual el segundo anillo está compuesto por elementos en forma de L espaciados verticalmente.

10. La estructura anular descrita en la reivindicación 9, en la cual el segundo elemento enfrentado se encuentra entre el primer elemento enfrentado y los elementos en forma de L, y en la cual los elementos en forma de L tienen extremos libres que terminan adyacentes al segundo elemento enfrentado.

11. La estructura anular descrita en la reivindicación 10, en la cual el primer elemento enfrentado tiene una primera región cortada que permite el acceso de los cables a la primera abertura, y en la cual esta región cortada está alineada en general con el segundo elemento enfrentado.

12. La estructura anular descrita en la reivindicación 11, en la cual la placa de base define por lo menos una muesca para permitir el paso de los cables a través de la placa de base.

13. Un método para el manejo de cables en un sistema de telecomunicaciones de conexiones en cruz, el cual comprende:

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la colocación de los cables conectados en cruz a través de un primer canal definido por una primera pluralidad de anillos; y

la colocación de los cables de energía y de tierra a través de un segundo canal definido por una segunda pluralidad de anillos, estando el primer canal separado del segundo canal de tal manera que los cables conectados en cruz quedan separados de los cables de energía y de tierra.

14. Un soporte para montar regletas de telecomunicaciones, cada una de ellas adaptada para recibir módulos conectados en cruz, el cual comprende:

un marco que tiene una parte frontal y una parte trasera;

un compartimento definido por el marco, formado entre dos paredes laterales, verticales y separadas, siendo el compartimento de dimensiones aptas para recibir las regletas de telecomunicaciones;

una pluralidad de anillos montados por la parte trasera del marco para recibir los cables conectados en cruz provenientes de los módulos conectados en cruz;

una pluralidad de placas de unión separadas verticalmente que sobresalen transversalmente de las paredes laterales verticales adyacentes al frente del marco, estando las

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placas de unión situadas y diseñadas para conectar el marco a un marco adyacente; y

una pluralidad de regiones de ranuras definidas por el marco, colocadas entre las placas de unión verticalmente separadas, siendo las regiones de ranuras de dimensiones aptas para permitir el acceso frontal a los cables de entrada y salida colocados entre el marco y el marco adyacente.

15. El soporte descrito en la reivindicación 14, en el cual los anillos incluyen porciones opuestas a las placas de unión de tal manera que un canal vertical para recibir los cables de entrada y salida se forma entre los anillos y las placas de unión.

16. El soporte descrito en la reivindicación 15, en el cual los anillos definen aberturas de acceso para permitir que los cables de entrada pasen a través del canal vertical hacia la parte trasera del marco.

17. Un soporte para montar regletas de telecomunicaciones, cada una de ellas adaptada para recibir módulos conectados en cruz, el cual está adaptado para ser usado con un sistema que comprende un piso elevado con orificios cortados para permitir el paso de los cables de energía a través del piso y con orificios cortados para permitir el paso de los cables de entrada y salida a través del piso; dicho soporte comprende:

un marco que tiene una parte superior y una base, en el cual la base incluye una placa de base que define un orificio para el paso de cables de energía adaptado para estar alineado con uno de los orificios cortados para el paso de cables de energía en el piso elevado;

un compartimento definido por el marco, formado entre dos paredes laterales, verticales y separadas, siendo el compartimento de dimensiones aptas para recibir las regletas de telecomunicaciones;

canales orientados hacia afuera que se extienden a lo largo de las paredes laterales verticales, que están situados y diseñados para recibir los cables de entrada y salida de tal manera que los cables de entrada y salida se extienden a lo largo de las paredes laterales verticales, y que, además, están adaptados para quedar alineados en general con los orificios cortados para el paso de los cables de entrada y salida en el piso elevado; y

un espacio libre para el paso de los cables, definido en por lo menos una de las paredes laterales verticales en la base del marco, que permite que los cables de entrada y salida se extiendan a lo largo de esa pared lateral vertical para pasar directamente por debajo del compartimento del marco, y que proporciona el espacio libre para permitir que los cables de entrada y salida circunden una obstrucción que bloquea

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parcialmente la abertura para los cables de entrada y salida que se encuentra en el piso.

18. El soporte descrito en la reivindicación 17, el cual comprende, además, una placa inclinada que se extiende desde la placa de base en un punto debajo de la bahía hasta la parte superior del espacio libre para el paso de los cables.

19. El soporte descrito en la reivindicación 17, el cual comprende, además, un guardacables colocado de manera adyacente a la base del marco, que tiene un elemento guardacables trasero que se extiende a lo largo de la parte trasera del marco y elementos guardacables laterales que se extienden a través de los canales orientados hacia afuera.

20. El soporte descrito en la reivindicación 19, el cual comprende, además, un guardacables interno que está colocado dentro del marco definido por el elemento guardacables trasero y los elementos guardacables laterales, y que está adaptado para cubrir una toma de corriente.

21. El soporte descrito en la reivindicación 20, en el cual el elemento guardacables trasero tiene una abertura de acceso para permitir el acceso a la toma de corriente, abertura que está ubicada en el guardacables interno y que está cubierta por una placa desmontable.

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22. El soporte descrito en la reivindicación 17, el cual comprende, además, una caja de protección montada en la base del marco, que consta de dos placas frontales separadas y desmontables, de las cuales la primera cubre gran parte de la cara frontal de la caja de protección y la segunda cubre una abertura de acceso a una toma de corriente.

23. Un sistema de soportes para montar regletas de telecomunicaciones, cada una de ellas adaptada para recibir módulos conectados en cruz, el cual comprende:

un primer soporte y un segundo soporte, cada uno de los cuales incluye:

un marco que tiene una parte frontal y una parte trasera y que define un compartimento formado entre dos paredes laterales, verticales y separadas, siendo el compartimento de dimensiones aptas para recibir las regletas de telecomunicaciones;

una pluralidad de anillos montados por la parte trasera del marco para recibir los cables conectados en cruz provenientes de los módulos conectados en cruz;

una pluralidad de placas de unión separadas verticalmente que sobresalen transversalmente de las paredes laterales verticales adyacentes al frente del marco, placas de unión que definen una pluralidad de regiones de ranuras colocadas entre las placas de unión separadas verticalmente;

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el primer soporte y el segundo soporte están interconectados de tal manera que las placas de unión del primer soporte están directamente adyacentes a las placas de unión del segundo soporte;

entre el primer soporte y el segundo soporte se define un canal vertical que recibe los cables de entrada y salida;

los anillos del primer soporte y del segundo soporte están situados y diseñados para definir el lado posterior del canal vertical; y

el canal vertical tiene un lado frontal definido por las placas de unión del primer soporte y del segundo soporte, y las regiones de ranuras del primer soporte y del segundo soporte están diseñadas para permitir el acceso frontal a los cables de entrada y salida dentro del canal vertical.

24. El sistema de soportes descrito en la reivindicación 23, en el cual las regiones de ranuras cooperan para definir aberturas de acceso frontal de forma generalmente rectangular.

25. El sistema de soportes descrito en la reivindicación 23, en el cual los anillos definen aberturas traseras para permitir el paso de los cables de entrada y salida por el canal vertical hacia la parte posterior de los marcos.

26. Un método para el manejo de cables en un sistema de telecomunicaciones de conexiones en cruz, el cual comprende:

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el uso de un soporte que incluye una pluralidad de regletas de telecomunicaciones en una torre vertical, en el cual cada regleta comprende una pluralidad de módulos conectados en cruz que tienen sitios traseros para las conexiones cruzadas y orificios de acceso frontal;

el enrutamiento de una primera pluralidad de cables de entrada y salida desde debajo de un piso que sustenta el soporte a través de una primera abertura en el piso;

la continuación del enrutamiento de la primera pluralidad de cables de entrada y salida verticalmente en un primer recorrido de cables a lo largo de un lado del soporte hacia el número plural de sitios traseros para las conexiones en cruz;

el enrutamiento de una segunda pluralidad de cables de entrada y salida desde debajo del piso a través de una segunda abertura en el piso, segunda abertura que está separada de la primera abertura;

la continuación del enrutamiento de la segunda pluralidad de cables de entrada y salida verticalmente en un segundo recorrido de cables a lo largo de un lado opuesto del soporte hacia la pluralidad de sitios traseros para las conexiones en cruz; y

el enrutamiento de una pluralidad de cables conectados en cruz para efectuar la conexión en cruz de uno o más de los módulos con los otros módulos.

27. El método descrito en la reivindicación 26, en el cual el soporte incluye una pluralidad de anillos que forman una torre vertical, en el cual los cables conectados en cruz están dentro de los anillos y en el cual los anillos definen un recorrido de cables separado del primero y del segundo recorridos de cables para los cables de entrada y salida.

[...]

[8 páginas con las Figuras.]

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Bogotá, 2 de mayo de 2000.

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THE UNITED STATES OF AMERICA

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February 28, 2000

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APPLICATION NUMBER: ***09/249,718***
FILING DATE: ***February 12, 1999***

By Authority of the
COMMISSIONER OF PATENTS AND TRADEMARKS

T. Lawrence

T. LAWRENCE
Certifying Officer

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: MENDOZA
Docket: 2316.1017US01
Title: CABLE MANAGEMENT RACK FOR TELECOMMUNICATIONS EQUIPMENT

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CERTIFICATE UNDER 37 CFR 1.10
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- ☒ Transmittal sheet, in duplicate, containing Certificate under 37 CFR 1.10.
- ☒ Utility Patent Application: Spec. 10 pgs; 27 claims; Abstract 1 pgs.:
- ☒ 8 sheets of informal drawings
- ☒ An unsigned Combined Declaration and Power of Attorney
- ☒ Return postcard
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M&G No. 2316.1017US01

CABLE MANAGEMENT RACK FOR TELECOMMUNICATIONS EQUIPMENT

Field of the Invention

The present invention relates generally to the field of telecommunications equipment. More particularly, the present invention relates to high density frames, bays or racks for providing cross-connections between telecommunication circuits.

Background of the Invention

A digital cross connect system (DSX) provides a location for interconnecting two digital transmission paths. The apparatus for a DSX is located in one or more frames, racks or bays, usually in a telephone central office. The DSX apparatus also provides jack access to the transmission paths.

DSX jacks are well known and typically include a plurality of bores sized for receiving co-axial or tip-and-ring plugs. In the case of co-axial plugs, the bores are provided with center conductors and co-axial grounds. In the case of tip-and-ring plugs, a plurality of spring contacts are provided within the bores for contacting the tip-and-ring plugs. The jacks are typically electrically connected to digital transmission lines, and are also electrically connected to a plurality of wire termination members used to cross-connect the jacks. By inserting plugs within the bores of the jacks, signals transmitted through the jacks can be interrupted or monitored.

The number of jacks or cross-connect points that are located at a bay of a given size is referred to as the density of a bay. As the cross-connect density increases, the management of telecommunication wires in the bay becomes increasingly complex. For high density DSX bays, wire management is critical.

Summary of the Invention

One aspect of the present invention relates to a rack for mounting telecommunication chassis each adapted for receiving cross-connect modules or jacks.

The rack includes a frame defining a bay formed between two spaced–apart, vertical end walls. The bay is sized for receiving the telecommunication chassis. The rack also includes a cable management structure connected to the frame. The cable management structure defines first and second separate vertical channels. The first vertical channel defines a first passage area sized for receiving a plurality of cross–connect cables from the chassis. The second vertical channel defines a second passage area sized for receiving power and ground wires from the chassis. The second passage area is substantially smaller than the first passage area.

Another aspect of the present invention relates to a ring structure for use with telecommunications equipment. The ring structure includes a base adapted for connection to a telecommunication cross–connect rack. The ring structure also includes a first ring that projects outward from the base plate and at least partially defines a first opening sized for receiving a plurality of cross–connect cables. The ring structure further includes a second ring that projects outward from the base plate and at least partially defines a second opening sized for receiving power and ground wires. The second opening is separate from the first opening.

A further aspect of the present invention relates to a rack for mounting telecommunication chassis each adapted for receiving cross–connect modules. The rack includes a frame having a front and a back. The frame defines a bay formed between two spaced–apart, vertical end walls. The bay is sized for receiving the telecommunication chassis. The rack also includes a plurality of rings mounted at the back of the frame for receiving cross–connect cables from the cross–connect modules. The rack further includes a plurality of vertically spaced–apart junction plates projecting transversely outward from the vertical end walls adjacent the front of the frame. The junction plates are arranged and configured for connecting the frame to an adjacent frame. A plurality of slot regions are positioned between the vertically spaced–apart junction plates. The slot regions are sized for allowing front access to input/output cables positioned between adjacent frames.

An additional aspect of the present invention relates to a rack for mounting telecommunication chassis each adapted for receiving cross–connect modules. The rack is adapted to be supported on a raised floor with cut–out power cable openings for passing power cables through the floor, and cut–out input/output

openings for passing input/output cables through the floor. The rack includes a frame having a top and a base. The base includes a base plate defining a power cable opening adapted to align with the cut–out power cable opening of the raised floor. The frame defines a bay formed between two spaced–apart, vertical end walls. The bay is sized for receiving the telecommunication chassis. The rack also includes outwardly facing channels that extend along the vertical end walls. The outwardly facing channels are arranged and configured for receiving input/output cables from the cross–connect modules. The outwardly facing channels are adapted to generally align with the cut–out input/output openings of the raised floor. At least one of the vertical end walls of the frame defines a cable clearance opening located at the base of the frame for allowing input/output cables extending along the at least one vertical end wall to pass directly beneath the frame. The clearance opening provides clearance for allowing the input/output cables to curve around an obstruction partially blocking the cut–out input/output opening in the floor.

A variety of advantages of the invention will be set forth in part in the description that follows, and in part will be apparent from the description, or may be learned by practicing the invention. It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory only and are not restrictive of the invention as claimed.

Brief Description of the Drawings

The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate several aspects of the invention and together with the description, serve to explain the principles of the invention. A brief description of the drawings is as follows:

Fig. 1 is a front view of two interconnected racks constructed in accordance with the principles of the present invention;

Fig. 2 is a rear perspective view of one of the racks of Fig. 1;

Fig. 3 is a rear perspective view of a frame used by the rack of Fig. 2;

Fig. 4 is a front perspective view of the frame of Fig. 3;

Fig. 5 is a cut–out detail for a raised floor adapted for supporting the rack of Fig. 2;

Fig. 6 is a floor mounting detail for the rack of Fig. 2;

Fig. 7 is a top mounting detail for the rack of Fig. 2;

Fig. 8 is a perspective view of one of a plurality of ring structures mounted at the back of the rack of Fig. 2;

Fig. 9 is a top plan view of the ring structure of Fig. 8;

Fig. 10 is an exploded perspective view of a cable guard assembly adapted to be mounted at the base of the rack of Fig. 2; and

Fig. 11 is an exploded perspective view of a guard box adapted to be mounted at the front of the rack of Fig. 2.

Detailed Description

Reference will now be made in detail to exemplary aspects of the present invention that are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

Fig. 1 shows a front view of two racks 20 constructed in accordance with the principles of the present invention. Each rack 20 includes a frame 22 having two spaced–apart, vertical end walls 24. Each set of vertical end walls 24 defines a bay 26 sized for receiving conventional telecommunication chassis 28 (for clarity, the chassis 28 are shown in only the right–most rack 20). The chassis 28 are each adapted for holding conventional cross–connect modules 30 (only shown in one of the chassis 28) which can be permanently or removably mounted within the chassis 28. The embodiment shown in Fig. 1 is a rear cross–connect system. The modules 30 define front ports 29. By inserting patch plugs within the ports 29, signals transmitted through the modules 30 can be interrupted or monitored. At the back of the racks 20, the modules 30 provide cross–connection locations, input connection locations, output connection locations, power connection locations, and ground connection locations.

In use, input/output cables are connected to the input/output connection locations, cross–connect cables are connected to the cross–connect locations, and ground and power wires are connected to the ground and power contact locations. As will be described later in the specification, the racks 20 are configured to provide for

effective cable management of the various cables and wires that interface with the modules 30 mounted on the racks 20.

Referring still to Fig. 1, the racks 20 include junction plates 32 that project transversely outward from the vertical end walls 24. The junction plates 32 are configured for interconnecting the two racks 20 together. For example, intermediate plates 34 can be bolted between the junction plates 32 to provide a mechanical connection. It is noted that the racks 20 are placed directly adjacent to one another with no fillers being positioned between the racks 20.

A vertical channel 36 is preferably positioned between the two racks 20. The vertical channel 36 would typically be used to provide vertical management of input and output cables 38 connected to the cross-connect modules 30. Front access openings 88 are provided to facilitate accessing the input/output cables 38 within the channel 36. To maximize the size of the vertical channel 36, each bay 26 preferably has a width W_1 that is relatively small as compared to a total width W_2 of each rack 20. For example, in certain embodiments, the width W_1 of each bay 26 is about 368 mm, and the width W_2 of each rack 20 is about 600 mm. It is preferred for the width W_1 of each bay 26 to be less than 400 mm.

Fig. 2 is a rear perspective view of one of the racks 20. For clarity and ease of description, the chassis 28 and cross-connect modules 30 have been removed from Fig. 2.

The rack 20 includes two columns of ring structures 40. Each column of ring structures 40 defines a first vertical channel 42 sized for receiving cross-connect cables 44 from the cross-connect modules, and a second vertical channel 46 sized for receiving power and ground wires 48 (e.g., 45 volt). By separating the cross-connect cables 44 from the power and ground wires 48, concerns about cross-talk between the wires and cables can be reduced.

Openings 50 are defined between adjacent ring structures 40 in each column. The openings 50 are configured for allowing the input/output cables 38 to be fed from the vertical channels 36 (shown in Fig. 1) to the backside of the rack 20 where electrical connections can be made with the input and output contact locations of the modules 30. It will be appreciated that the input/output cables 38, the cross-connect cables 44 and the power and ground wires 48 have been shown schematically.

Referring still to Fig. 2, the rack 20 includes upper and lower troughs 52 and 54 for supporting cross–connect cables that are fed across the back of the rack 20. The cross–connect cables are fed between racks to provide cross–connections between modules of different racks. Support brackets 56 are used to support cross–connect wires that extend between two adjacent racks. The channels 42 defined by the ring structures 40 provided for vertical cable management of the cross–connect cables.

A cable guard assembly 58 is positioned below the lower trough 54 at the base of the rack 20 (e.g., at floor level). The cable guard assembly 58 includes a guard box 60 positioned at the front of the rack 20, end guard members 54 that cover the ends of rack 20, and a rear guard member 56 that covers the back of the rack 20. Holes are provided in various components of the guard assembly 58 to reduce weight and cost.

Referring to Figs. 3 and 4, the frame 22 of the racks 20 is shown in isolation. The frame 22 includes a top end 68 positioned opposite from a base end 70. A base box 69 is formed adjacent the base end 70. The base box 69 includes opposing front and back walls 72 and 74. The front and back walls 72 and 74 define openings 76 for accessing the interior of the base box 69. The base box 69 also includes a base plate 78 adapted to be positioned at floor level, and a horizontal wall 80 positioned above the base plate 78. The horizontal wall 80 defines the bottom of the bay 26.

Referring to Fig. 3, the frame 22 includes rear lips 82 that project transversely outward from the vertical end walls 24 adjacent the backside of the frame 22. The rear lips 82 define a plurality of openings 84 for use in bolting or otherwise connecting the ring structures 40 to the backside of the frame 22. Similar front lips 86 project transversely outward from the vertical end walls 24 adjacent the front of the frame 22. The front lips 86 define openings 87 for allowing the chassis 28 to be bolted or otherwise connected to the frame 22.

The junction plates 32 of the rack 20 are integral with the front lips 86. Slots or cut–out portions 88a and 88b are formed between the junction plates 32. The cut–out portions 88a and 88b are configured for allowing front access to the input/output cables 38 positioned within the vertical channel 36 formed between the racks 20. For example, as shown in Fig. 1, the cut–out portions 88a and 88b cooperate to define the front access openings 88. It is preferred for the cut–out portions 88 to each have a height H_1 that is longer than a corresponding height H_2 of the junction plates 32.

In certain embodiments, the heights H_1 of the cut-out portions 88 are at least two or three times as large as the heights H_2 of the junction plates 32.

Fig. 5 shows one of a plurality of floor tile 90 suitable for supporting the rack 20. The floor tile 90 is preferably raised above a main floor such that cables (e.g., A/C power cables and input/output cables) can be passed beneath the raised floor 90. In one particular embodiment, the floor tile 90 is 600mm X 600mm and is supported by a support grid 91. A hole pattern is cut into one half of the tile 90. The hole pattern includes a central opening 92 through which an A/C power cable can be passed. The pattern also includes four slots 94 for use in bolting one of the racks 20 to the raised floor 90. The pattern further includes two rectangular cutouts 96 for passing input and output cables 38 through the raised floor 90 and into the vertical channels 36 defined between the racks 20. The cutouts are partially obstructed by the support grid 91.

Fig. 6 is a plan view of the base plate 78 of the frame 22. The base plate 78 defines four slots 98 adapted to align with the slots 94 cut through the raised floor 90. The base plate 78 also includes a central opening 100 adapted to align with the central opening 92 of the raised floor 90. The outwardly facing channels 36 of the frame 22 are adapted to align with the rectangular cutouts 96 in the raised floor 90. To connect the racks 20 to the floor, bolts are secured through the slots 94 and 98. To provide A/C power adjacent the rack 20, an A/C power cable can be fed through the central openings 92 and 100. Preferably, the A/C power cable is electrically connected to an outlet that can be mounted in one of the openings 76 defined by the front and back walls 72 and 74 of the frame box structure.

Fig. 7 shows a mounting detail for the top end 68 of the rack 20. The top end 68 includes a horizontal top plate 104 that defines the top of the bay 26. Three holes 106 are formed through the top plate 104. The holes 106 can be used to secure the top end 68 of the rack 20 to a ceiling or other structure through the use of attachment rods.

Referring back to Fig. 3, the right-most vertical end wall 24 defines a clearance opening 108 located at the base of the frame 22. The clearance opening 108 is configured for allowing input/output cables 38 (shown in Fig. 1) that extend along the right-most vertical wall 24 to pass directly beneath the bay 26 of the frame 22. In this manner, the clearance opening 108 provides clearance for allowing the input/output

cables 38 to curve around or otherwise bypass an obstruction (e.g., the support grid 91 of Fig. 5) that may partially block the rectangular cut-out 96 in the raised floor 90. Absent the clearance opening 108, the support grid 91 would reduce the capacity of the vertical channels 36.

An inclined plate 110 is positioned adjacent to the clearance opening 108. The inclined plate 110 extends from the base plate 78 to a location above the clearance opening 108. At least a portion of the inclined plate 110 is located directly beneath the bay 26. The inclined plate 110 functions to protect the cables passing through the clearance opening 108.

Figs. 8 and 9 show one of the ring structures 40 in isolation from the rack 20. The ring structure 40 includes a base 112 adapted for connection to the rack 20 (e.g., bolt holes are provided through the base 112 for allowing the ring structure 40 to be bolted to the frame 22). The ring structure 40 also includes first and second opposing members 114 and 116 that project transversely outward from the base plate 112 and at least partially define a first opening 118 sized for receiving a plurality of cross-connect cables. The first and second opposing members 116 and 118 have bent ends 120 that extend toward one another and are generally parallel with respect to the base 112. A cut-away portion 122 is formed through the first opposing member 114 for allowing cross-connect cables to be fed into the first opening 118. The second opposing member 116 is in general alignment with the cut away portion 122.

The ring structure 40 also includes first and second vertically spaced-apart L-shaped members 124 that at least partially define a second opening 126 sized for receiving power and ground wires. The L-shaped members have free ends 128 that terminate adjacent the second opposing member 116. When a plurality of the ring structures 40 are mounted in a column along the frame 22, the first openings 118 are aligned along a first vertical axis to form the first vertical channel 36, and the second openings 126 are aligned along a second vertical axis to form the second vertical channel 46. As mounted on the frame 22, the outer surfaces of the first opposing members 114 align generally with the outermost edges of the junction plates 34. Consequently, when two racks 20 are interconnected as shown in Fig. 1, ring structures 40 corresponding to one of the racks 20 are placed in close proximity to ring structures

40 corresponding to the other of the racks 20 such that the ring structures 40 enclose the back of the channel 36 defined between the racks 20.

Referring to Fig. 8, the base 112 of the ring structure 40 defines upper and lower notches 50a and 50b. When mounted on the rack 20, as shown in Fig. 1, the upper and lower notches 50a and 50b of the ring structures 40 cooperate to define the access openings 50.

Referring to Fig. 9, the first opening 118 preferably has a cable passage area that is substantially larger than the cable passage area of the second opening 126. For example, as shown in Fig. 9, the first opening 118 has a cable passage area that is over 25 times as large as the cable passage area of the second opening 126.

Fig. 10 shows the rear and end guard members 57 and 55 (which are made as a single piece component) of the cable guard assembly 58 in isolation from the rack 20. As shown in Fig. 10, the rear guard member 57 defines an access opening 130 for allowing access to an A/C power outlet secured to the frame 22. When the access opening 130 is not in use, a removable cover plate 132 bolted to the rear guard 62 is used to close the opening 130.

The rear guard member 57 and the side guard members 55 are preferably connected to the frame 22 by conventional techniques such as bolts. For example, as shown in Fig. 10, the side guard members 55 include flanges 134 adapted to be bolted to the lower–most junction plates 32 of the frame 22.

Referring still to Fig. 10, the cable guard assembly 58 also includes an inner cable guard 136 that is preferably bolted to the back wall 72 of the base box 69. In certain embodiments, the inner cable guard 136 can be welded or otherwise fixedly connected to the frame 20 to provide additional structural support. The inner cable guard 136 forms a housing that encloses the openings 76 defined by the back wall 74 and functions to cover A/C outlets that can be mounted in the openings 76 or mounted elsewhere within the inner cable guard 136 (e.g., at the opening 130).

Fig. 11 shows the guard box 60 in isolation from the frame 22. The guard box 60 includes a main housing 138 that is preferably bolted to the front wall 72 of the box structure 69. The main housing 138 includes a top wall 140 and two spaced–apart end walls 142. In certain embodiments, the top wall 140 can be welded or otherwise fixedly connected to the frame 20 to provide additional frame support. The

end walls 142 define cable openings 144 for allowing an A/C power cable to be fed between adjacent racks 20. A back side of the main housing 138 is substantially open. A front side of the main housing 138 includes a central face plate 139 that extends downward from the top wall 140. The remainder of the front side of the main housing 138 is covered by a removable main face plate 148. The main face plate 148 includes a cut–out portion 149 for receiving the central face plate 139. The central face plate 139 defines a central opening 150 for providing access to an A/C outlet mounted within the box 60 (e.g., adjacent the central opening 150). A rectangular cover plate 154 is used to cover the access opening 150. The outlet cover 154 and the main cover 148 are preferably bolted to the main housing 138 so as to be removable. In this manner, the main face plate 148 can be removed without removing the outlet cover 154.

With regard to the foregoing description, it is to be understood that changes may be made in detail, especially in matters of the shape, size and arrangement of the parts without departing from the scope of the present invention. It is intended that the specification and depicted aspects be considered exemplary only, with a true scope and spirit of the invention being indicated by the broad meaning of the following claims.

I CLAIM:

1. A rack for mounting telecommunication chassis each adapted for receiving cross-connect modules, the rack comprising:

a frame defining a bay formed between two spaced-apart, vertical end walls, the bay being sized for receiving the telecommunication chassis; and

a cable management structure connected to the frame, the cable management structure defining first and second separate vertical channels, the first vertical channel defining a first passage area sized for receiving a plurality of cross-connect cables from the telecommunication chassis, the second vertical channel defining a second passage area sized for receiving power and ground wires from the telecommunication chassis, the second passage area being substantially smaller than the first passage area.

2. The rack of claim 1, wherein the cable management structure includes a plurality of separate ring structures connected to the frame, each ring structure defining a first opening sized for receiving the plurality of cross-connect cables and a second opening sized for receiving the power and ground wires, the ring structures being mounted on the frame such that the first openings are aligned along a first vertical axis to form the first vertical channel, and the second openings are aligned along a second vertical axis to form the second vertical channel.

3. The rack of claim 2, wherein each ring structure includes: a base plate; first ring defining members that project outward from the base plate and at least partially define the first opening; second ring defining members that project outward from the base plate and at least partially define the second opening.

4. The rack of claim 3, wherein the first ring defining members include first and second opposing members having bent ends that extend toward one another , and wherein the second ring defining members include vertically spaced-apart L-shaped members.

5. The rack of claim 4, wherein the second opposing member is located between the first opposing member and the L–shaped members, and the L–shaped members have free ends that terminate adjacent the second opposing member.

6. The rack of claim 5, wherein the first opposing member defines a first cut–away region for providing cable access to the first opening, the cut–away region being in general alignment with the second opposing member.

7. The rack of claim 6, wherein the base plate defines at least one notch for passing input and output cables through the base plate.

8. A cable management ring structure for use with telecommunications equipment, the ring structure comprising:

a base adapted for connection to a telecommunication cross–connect rack;

a first ring that project outward from the base plate and at least partially defines a first opening sized for receiving a plurality of cross–connect cables;

a second ring that projects outward from the base plate and at least partially defines a second opening sized for receiving power and ground wires, the second opening being separate from the first opening.

9. The ring structure of claim 8, wherein the first ring includes first and second opposing members having bent ends that extend toward one another, and wherein the second ring includes vertically spaced–apart L–shaped members.

10. The ring structure of claim 9, wherein the second opposing member is located between the first opposing member and the L–shaped members, and the L–shaped members have free ends that terminate adjacent the second opposing member.

11. The ring structure of claim 10, wherein the first opposing member defines a first cut–away region for providing cable access to the first opening, the cut–away region being in general alignment with the second opposing member.

12. The ring structure of claim 11, wherein the base plate defines at least one notch for passing cables through the base plate.

13. A method for managing cables in a telecommunication cross–connect system comprising:

placing cross–connect cables through a first channel defined by a first plurality of rings; and

placing power and ground wires through a second channel defined by a second plurality of rings, wherein the first channel is separate from the second channel such that the cross–connect cables are separated from the power and ground wires.

14. A rack for mounting telecommunication chassis each adapted for receiving cross–connect modules, the rack comprising:

a frame including a front and a back;

the frame defining a bay formed between two spaced–apart, vertical end walls, the bay being sized for receiving the telecommunication chassis;

a plurality of rings mounted at the back of the frame for receiving cross–connect cables from the cross–connect modules;

a plurality of vertically spaced–apart junction plates projecting transversely outward from the vertical end walls adjacent the front of the frame, the junction plates being arranged and configured for connecting the frame to an adjacent frame; and

the frame defining a plurality of slot regions positioned between the vertically spaced–apart junction plates, the slot regions being sized for allowing front access to input/output cables positioned between the frame and the adjacent frame.

15. The rack of claim 14, wherein the rings include portions that oppose the junction plates such that a vertical channel for receiving the input/output cables is formed between the rings and the junction plates.

16. The rack of claim 15, wherein the rings define access openings for allowing the input cables to be fed from the vertical channel to the back of the frame.

17. A rack for mounting telecommunication chassis each adapted for receiving cross–connect modules, the rack being adapted for use with a system having a raised floor with cut–out power cable openings for passing power cables through the floor and cut–out input/output openings for passing input/output cables through the floor, the rack comprising:

a frame including a top and a base, the base including a base plate defining a power cable opening adapted to align with one of the cut–out power cable openings of the raised floor;

the frame defining a bay formed between two spaced–apart, vertical end walls, the bay being sized for receiving the telecommunication chassis;

outwardly facing channels that extend along the vertical end walls, the outwardly facing channels being arranged and configured for receiving the input/output cables such that the input/output cables extend along the vertical end walls, and the outwardly facing channels being adapted to generally align with the cut–out input/output openings of the raised floor; and

at least one of the vertical end walls defining a cable clearance opening located at the base of the frame for allowing the input/output cables extending along the at least one vertical end wall to pass directly beneath the bay of the frame, wherein the clearance opening provides clearance for allowing the input/output cables to curve around an obstruction partially blocking the cut–out input/output opening in the floor.

18. The rack of claim 17, further comprising an inclined plate extending from the base plate at a location beneath the bay to a top of the clearance opening.

19. The rack of claim 17, further comprising a cable guard positioned adjacent the base of the frame, the cable guard a rear cable guard member extending along a rear of the frame, and end cable guard members extending across the outwardly facing channels.

20. The rack of claim 19, further comprising an inner cable guard positioned inside the rear cable guard member and the end cable guard members, the inner cable guard member being adapted for covering a power outlet.

21. The rack of claim 20, wherein the rear cable guard member defines an access opening for allowing access to the power outlet positioned within the inner cable guard, and wherein the access opening is covered by a removable plate.

22. The rack of claim 17, further comprising a guard box mounted at the base of the frame, the guard box including first and second separate removable face plates, the first face plate covering a majority of a front face of the guard box, and the second face plate covering an outlet access opening.

23. A rack system for mounting telecommunication chassis each adapted for receiving cross-connect modules, the rack system comprising:

first and second racks each including:

a frame including a front and a back, the frame defining a bay formed between two spaced-apart, vertical end walls, the bay being sized for receiving the telecommunication chassis;

a plurality of rings mounted at the back of the frame for receiving cross-connect cables from the cross-connect modules;

a plurality of vertically spaced-apart junction plates projecting transversely outward from the vertical end walls adjacent the front of the frame, the junction plates defining a plurality of slot regions positioned between the vertically spaced-apart junction plates the slot regions;

the first and second racks being interconnected such that the junction plates of the first rack are directly adjacent to the junction plates of the second rack;

the first and second racks defining a vertical channel thereinbetween for receiving input/output cables;

the rings of the first and second racks being arranged and configured to enclose a back side of the vertical channel; and

the vertical channel having a front side enclosed by the junction plates of the first and second racks, wherein the slot regions of the first and second racks are configured to provide front access to the input/output cables within the vertical channel.

24. The rack system of claim 23, wherein the slot regions cooperate to define generally rectangular front access openings.

25. The rack system of claim 23, wherein the rings defined rear openings for feeding the input/output cables from the vertical channel to the rear of the frames.

26. A method for managing cables in a telecommunication cross–connect system comprising:

providing a rack including a plurality of telecommunication chassis in a vertical stack, each chassis including a plurality of cross–connect modules including rear cross–connection locations and front access bores;

routing a first plurality of input/output cables from beneath a floor supporting the rack through a first opening in the floor;

further routing the first plurality of input/output cables vertically in a first cable pathway along one side of the rack to the plurality of rear cross–connection locations;

routing a second plurality of input/output cables from beneath the floor through a second opening in the floor, the second opening being separate from the first opening;

further routing the second plurality of input/output cables vertically in a second cable pathway along an opposite side of the rack to the plurality of rear cross–connection locations; and

routing a plurality of cross–connect cables to cross–connect one or more of the modules to other modules.

27. The method of claim 26, wherein the rack includes a plurality of rings stacked vertically, the cross–connect cables positioned within the rings, wherein the rings define a cable pathway separate from the first and second cable pathway for the input/output cable.

Abstract

The present disclosure relates to a rack for mounting telecommunication chassis each adapted for receiving cross-connect modules. The rack includes a frame defining a bay formed between two spaced-apart, vertical end walls. The bay is sized for receiving the telecommunication chassis. The rack also includes a cable management structure connected to the frame. The cable management structure defines first and second separate vertical channels. The first vertical channel defines a first passage area sized for receiving a plurality of cross-connect cables from the telecommunication chassis. The second vertical channel defines a second passage area sized for receiving power and ground wires from the telecommunication chassis.

CERTIFICATE UNDER 37 CFR 1.10:

"Express Mail" mailing label number: EL309469196US

Date of Deposit: Feb. 12, 1999

I hereby certify that this paper or fee is being deposited with the U.S. Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to BOX PATENT APPLICATION, Assistant Commissioner for Patents, Washington, D.C. 20231.

By: Walter M White

Name: Walter M White

Attorney Docket No. 2316.1017US01

MERCHANT, GOULD, SMITH, EDELL, WELTER & SCHMIDT

United States Patent Application

COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor I hereby declare that: my residence, post office address and citizenship are as stated below next to my name; that

I verily believe I am the original, first and sole inventor (if only one name is listed below) or a joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: **CABLE MANAGEMENT RACK FOR TELECOMMUNICATIONS EQUIPMENT**

The specification of which

a. ☒ is attached hereto

b. ☒ is entitled **CABLE MANAGEMENT RACK FOR TELECOMMUNICATIONS EQUIPMENT**, identified as **Attorney Docket No. 2316.1017US01.**

c. ☐ was filed on as application serial no. and was amended on (if applicable) (in the case of a PCT-filed application) described and claimed in international no. filed and as amended on (if any), which I have reviewed and for which I solicit a United States patent.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, § 1.56 (attached hereto).

I hereby claim foreign priority benefits under Title 35, United States Code, § 119/365 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on the basis of which priority is claimed:

a. ☒ no such applications have been filed.

b. ☐ such applications have been filed as follows:

FOREIGN APPLICATION(S), IF ANY, CLAIMING PRIORITY UNDER 35 USC § 119			
COUNTRY	APPLICATION NUMBER	DATE OF FILING (day, month, year)	DATE OF ISSUE (day, month, year)
ALL FOREIGN APPLICATION(S), IF ANY, FILED BEFORE THE PRIORITY APPLICATION(S)			
COUNTRY	APPLICATION NUMBER	DATE OF FILING (day, month, year)	DATE OF ISSUE (day, month, year)

I hereby claim the benefit under Title 35, United States Code, § 120/365 of any United States and PCT international application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

U.S. APPLICATION NUMBER	DATE OF FILING (day, month, year)	STATUS (patented, pending, abandoned)

I hereby claim the benefit under Title 35, United States Code § 119(e) of any United States provisional application(s) listed below:

U.S. PROVISIONAL APPLICATION NUMBER	DATE OF FILING (Day, Month, Year)

I hereby appoint the following attorney(s) and/or patent agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith:

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Knearl, Homer L.	Reg. No. 21,197	Witt, Jonelle	Reg. No. 41,980
Komanduri, Janaki	Reg. No. 40,684	Wood, Gregory B.	Reg. No. 28,133
Kowalchyk, Alan W.	Reg. No. 31,535	Wood, William J.	Reg. No. 42,236
Kowalchyk, Katherine M.	Reg. No. 36,848	Xu, Min S.	Reg. No. 39,536
Kubota, Glenn M.	Reg. No. P-44,197		

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Please direct all correspondence in this case to Merchant, Gould, Smith, Edell, Welter & Schmidt at the address indicated below:

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

2	**Full Name Of Inventor**	**Family Name** MENDOZA	**First Given Name** JOSE--FILONEL	**Second Given Name** TAWAG
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§ 1.56 Duty to disclose information material to patentability.

(a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to each pending claim until the claim is canceled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability of a claim that is canceled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to the patentability of any existing claim. The duty to disclose all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by §§ 1.97(b)–(d) and 1.98. However, no patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:

(1) prior art cited in search reports of a foreign patent office in a counterpart application, and

(2) the closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentably defines, to make sure that any material information contained therein is disclosed to the Office.

(b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and

(1) It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or

(2) It refutes, or is inconsistent with, a position the applicant takes in:

(i) Opposing an argument of unpatentability relied on by the Office, or

(ii) Asserting an argument of patentability.

A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden–of–proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

(c) Individuals associated with the filing or prosecution of a patent application within the meaning of this section are:

(1) Each inventor named in the application:

(2) Each attorney or agent who prepares or prosecutes the application; and

(3) Every other person who is substantively involved in the preparation or prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application.

(d) Individuals other than the attorney, agent or inventor may comply with this section by disclosing information to the attorney, agent, or inventor.

FIG.1

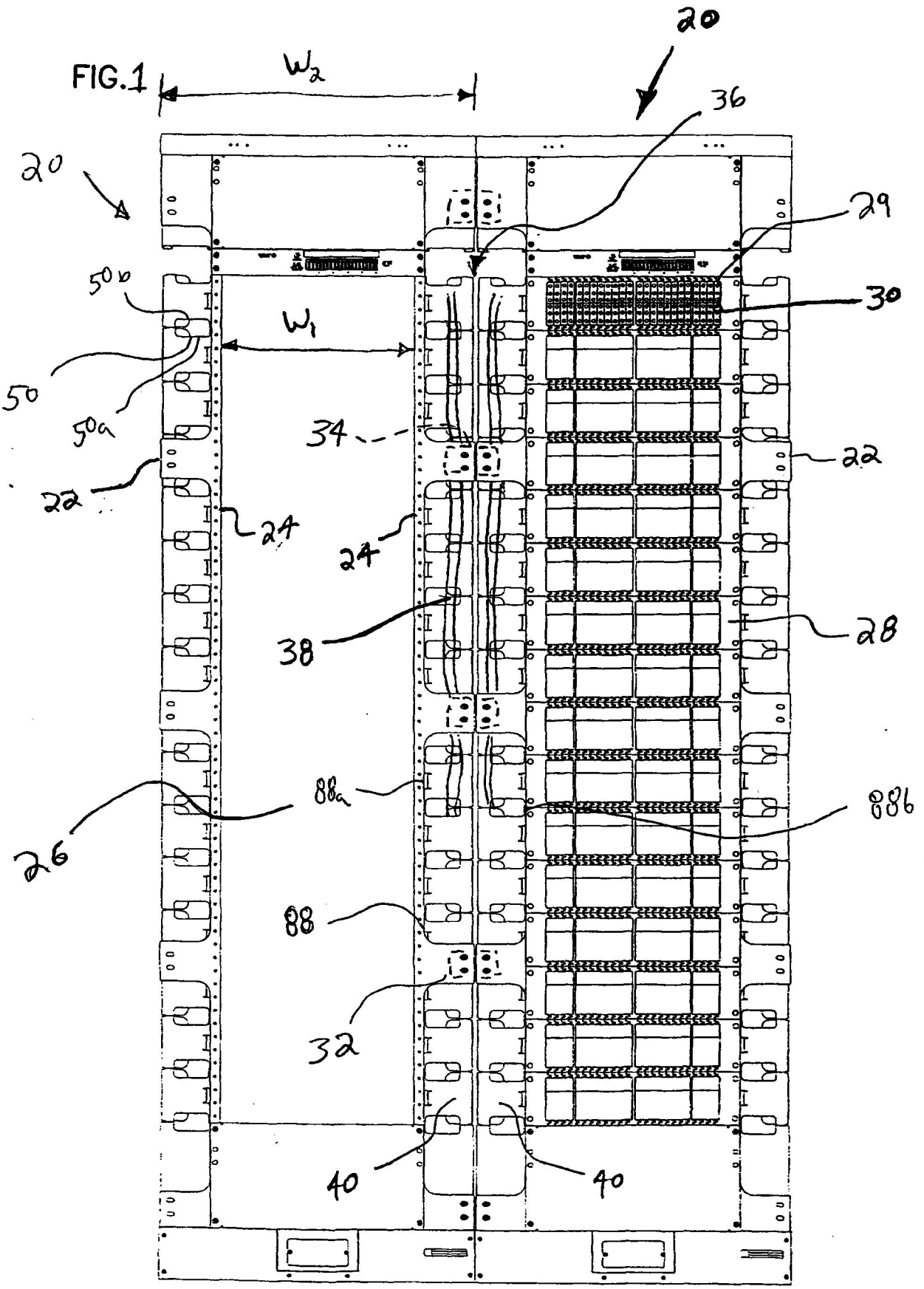

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FIG. 2

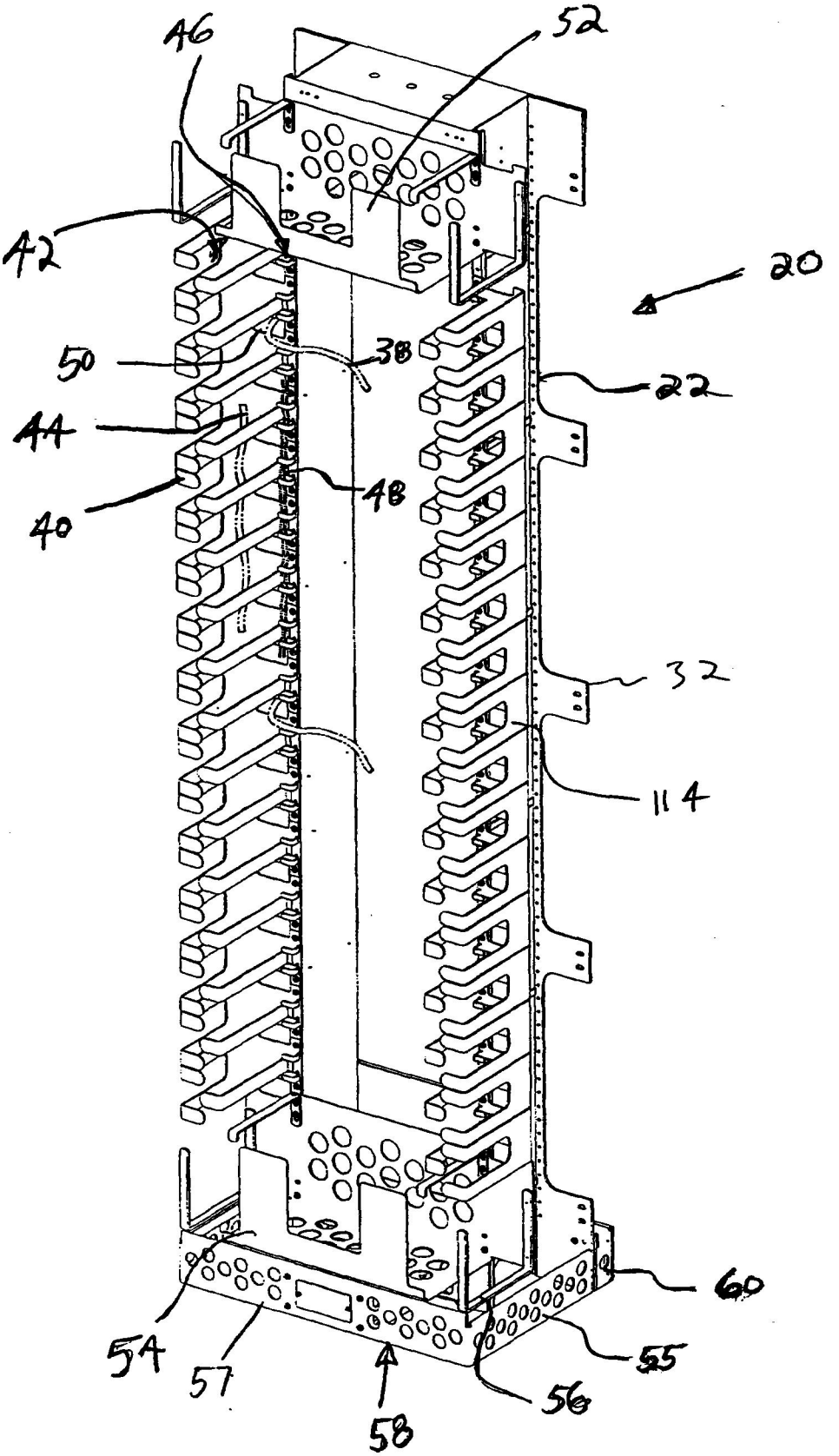


FIG. 3

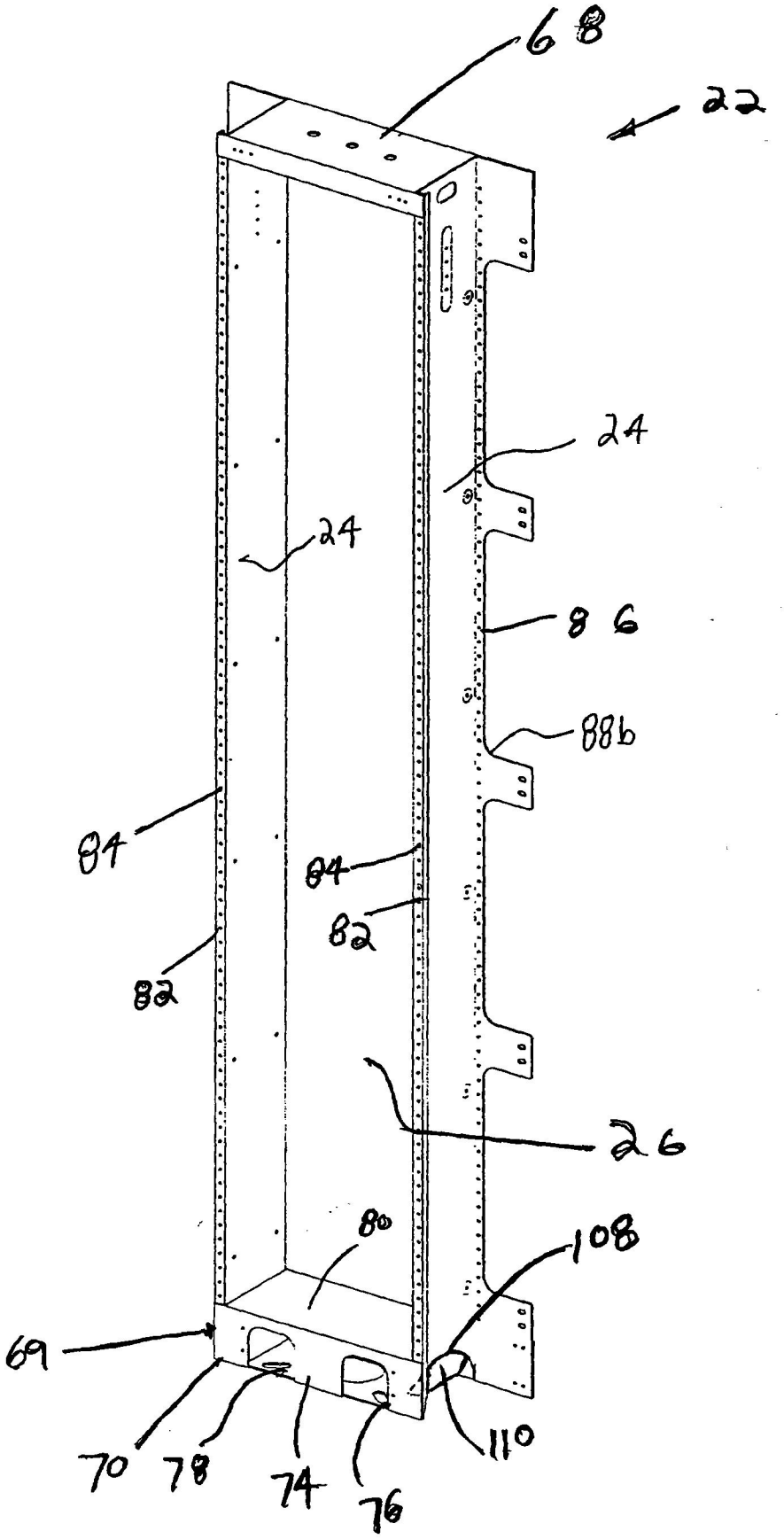


FIG. 4

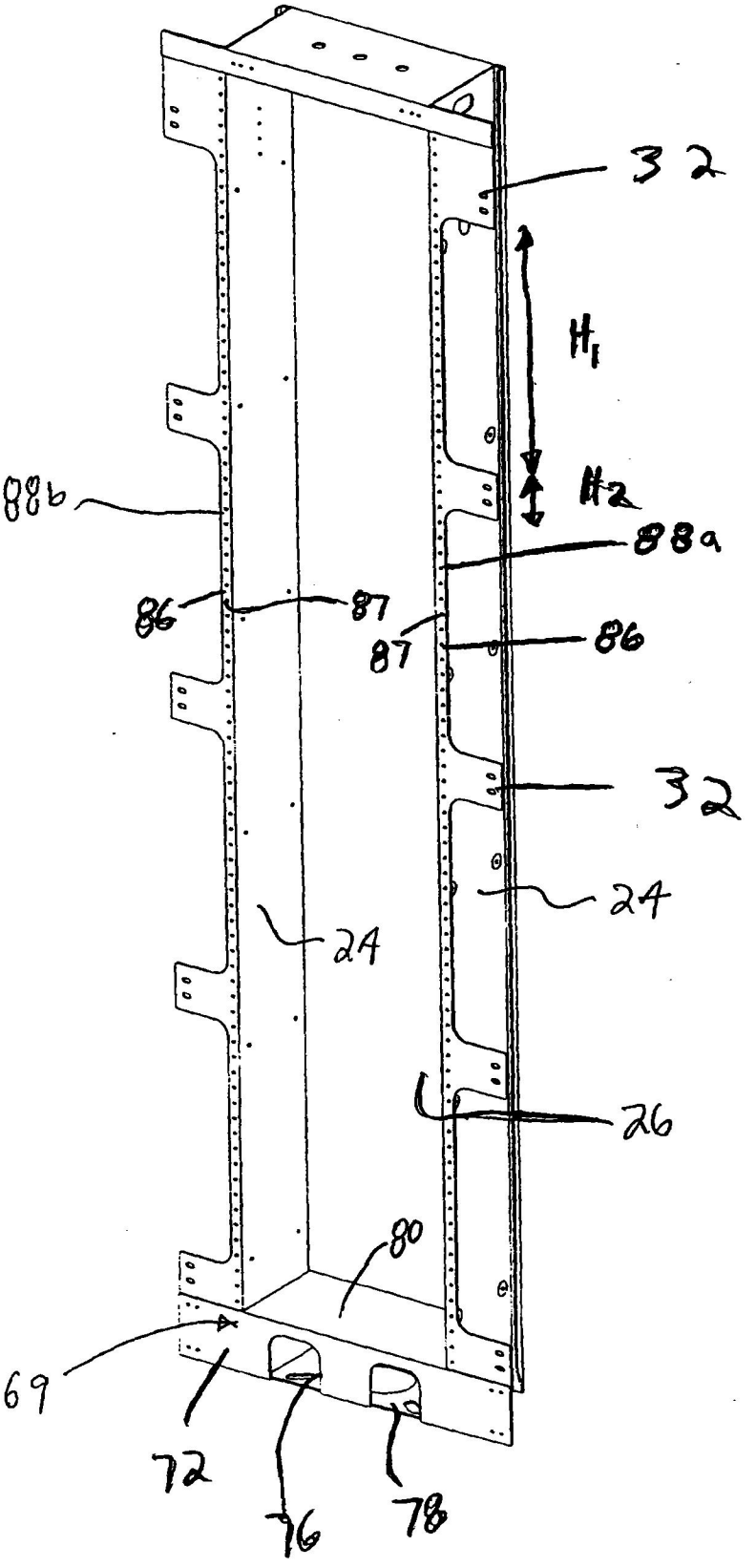


FIG. 5

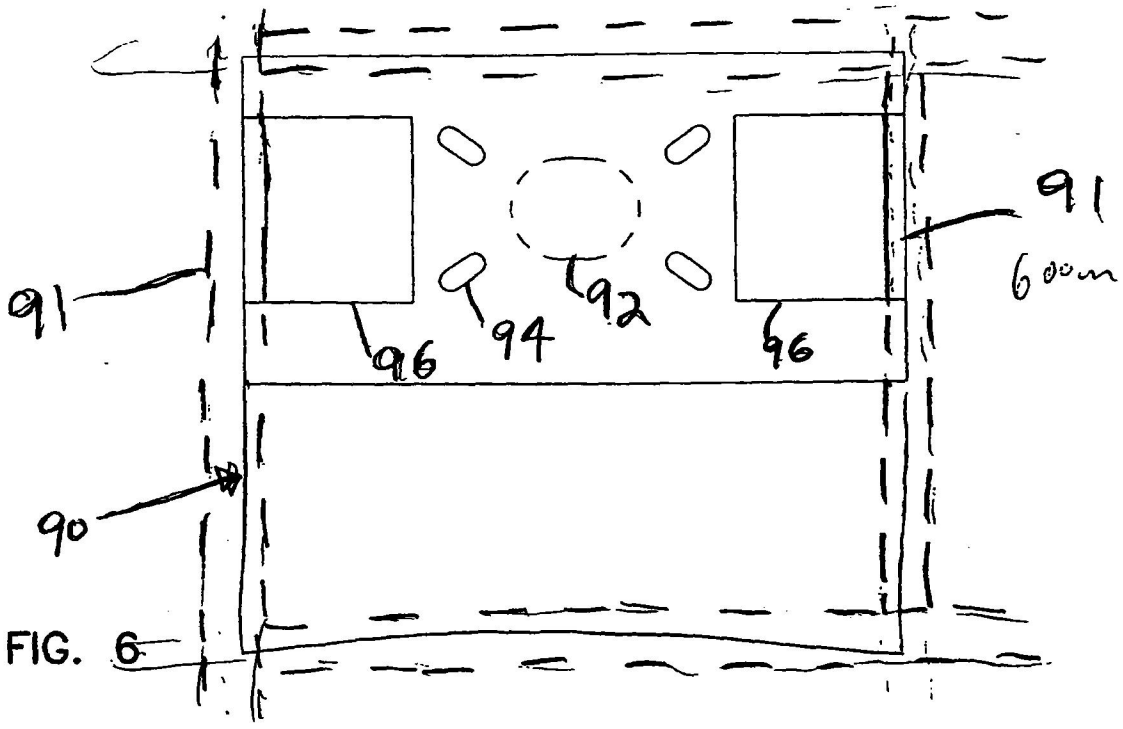


FIG. 6

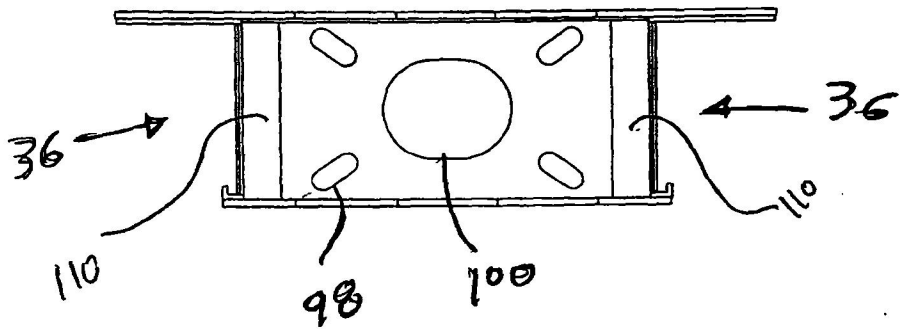


FIG. 7

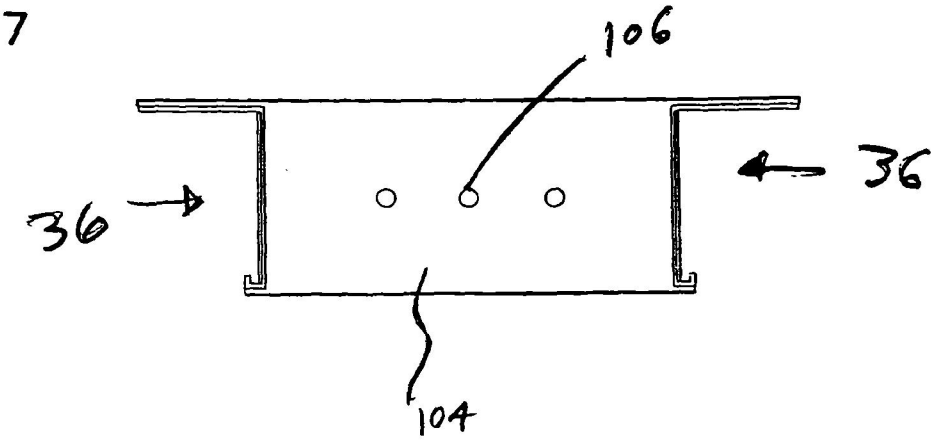


FIG. 8

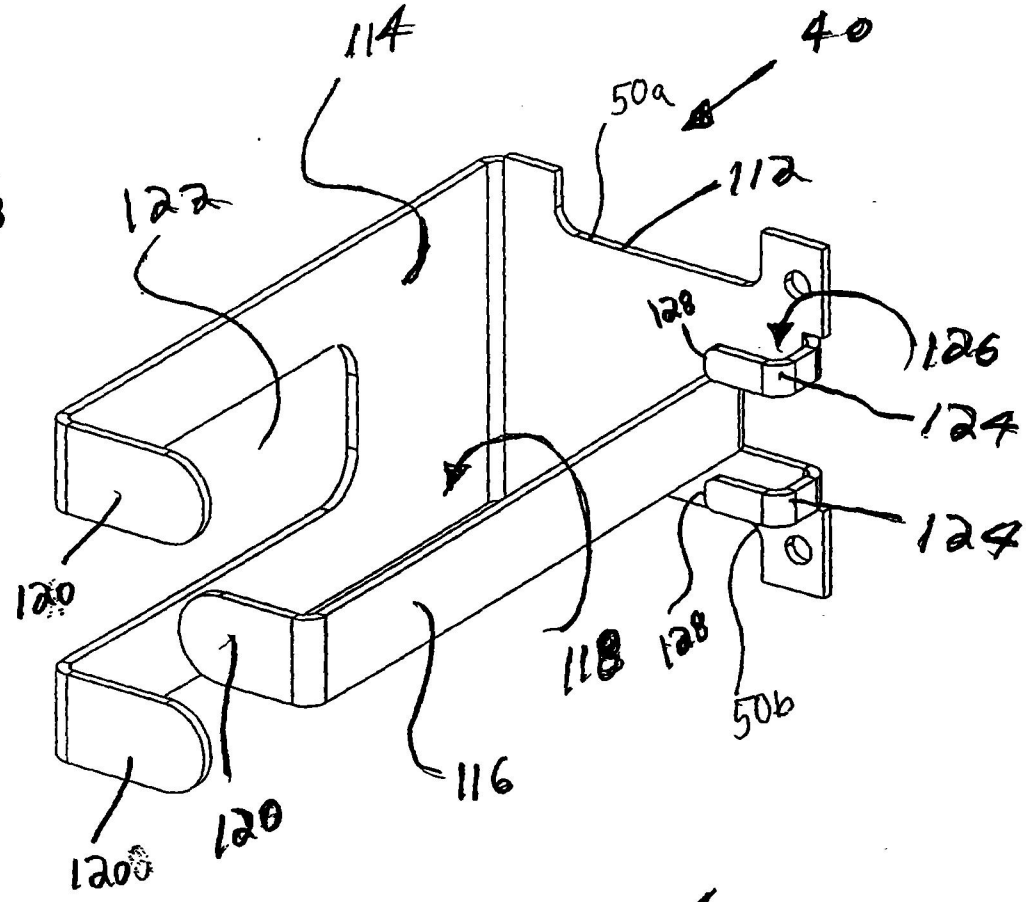

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FIG. 9

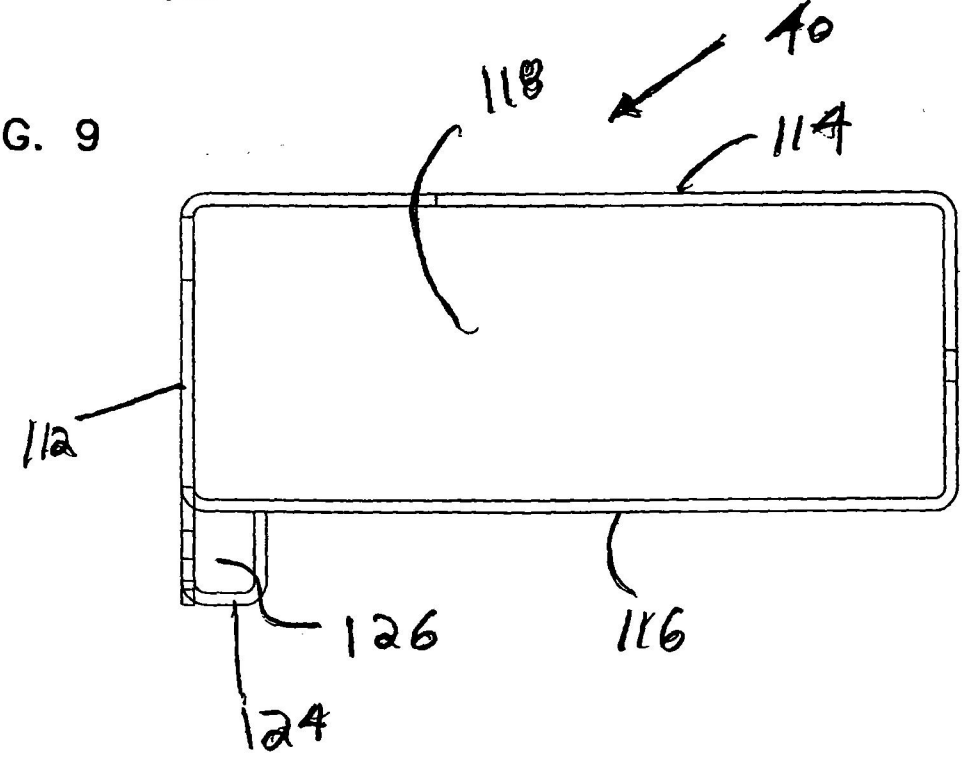
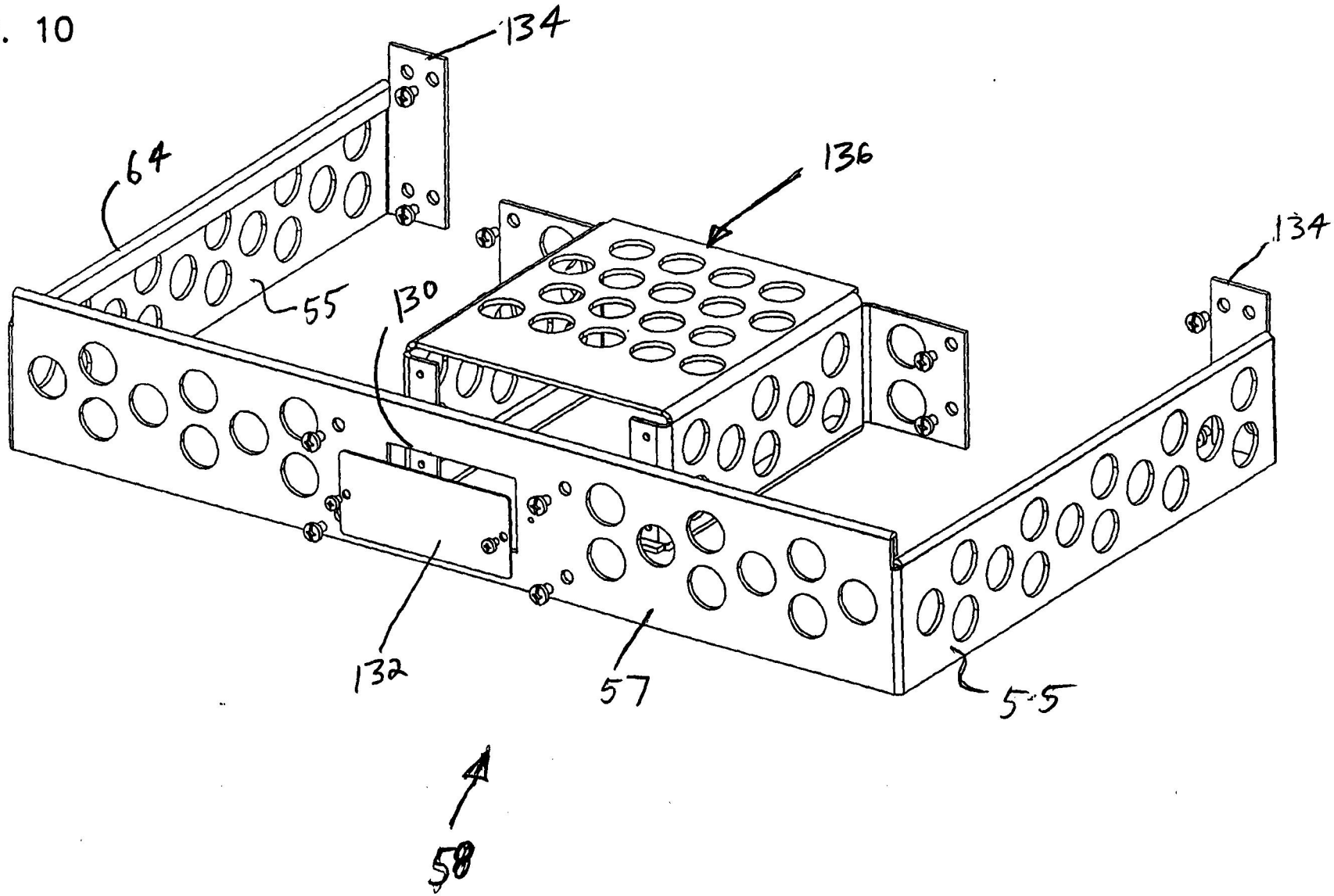

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FIG. 10



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FIG. 11

