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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
61/789,499	03/15/2013		250	USCO-053P		

CONFIRMATION NO. 7041

34203

Michael L. Leetzow, P.A.
2393 Crest Ridge Ct
SANFORD, FL 32771

FILING RECEIPT



OC000000060886939

Date Mailed: 05/03/2013

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Inventor(s)

Hiep Nguyen, Fort Mill, SC;
Darrell R. Childers, Hickory, NC;
Michael E. Hughes, Hickory, NC;
Jillcha F. Wakjira, Hickory, NC;
Joseph P. Howard, Hickory, NC;

Applicant(s)

Hiep Nguyen, Fort Mill, SC;
Darrell R. Childers, Hickory, NC;
Michael E. Hughes, Hickory, NC;
Jillcha F. Wakjira, Hickory, NC;
Joseph P. Howard, Hickory, NC;

Power of Attorney:

Michael Leetzow--35932

If Required, Foreign Filing License Granted: 05/01/2013

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 61/789,499**

Projected Publication Date: None, application is not eligible for pre-grant publication

Non-Publication Request: No

Early Publication Request: No

Title

Alignment Adapter and Alignment Design for a Connector Therefor

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications:

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Title 37, Code of Federal Regulations, 5.11 & 5.15

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RECORD OF INVENTION

1. Name(s) of Inventor(s): Hiep Nguyen, Darrell Childers, Mike Hughes, Jillcha Wakjira, Joe Howard
2. Short Title of Invention: EMI Card-Edge Adapter

US Conec Proprietary

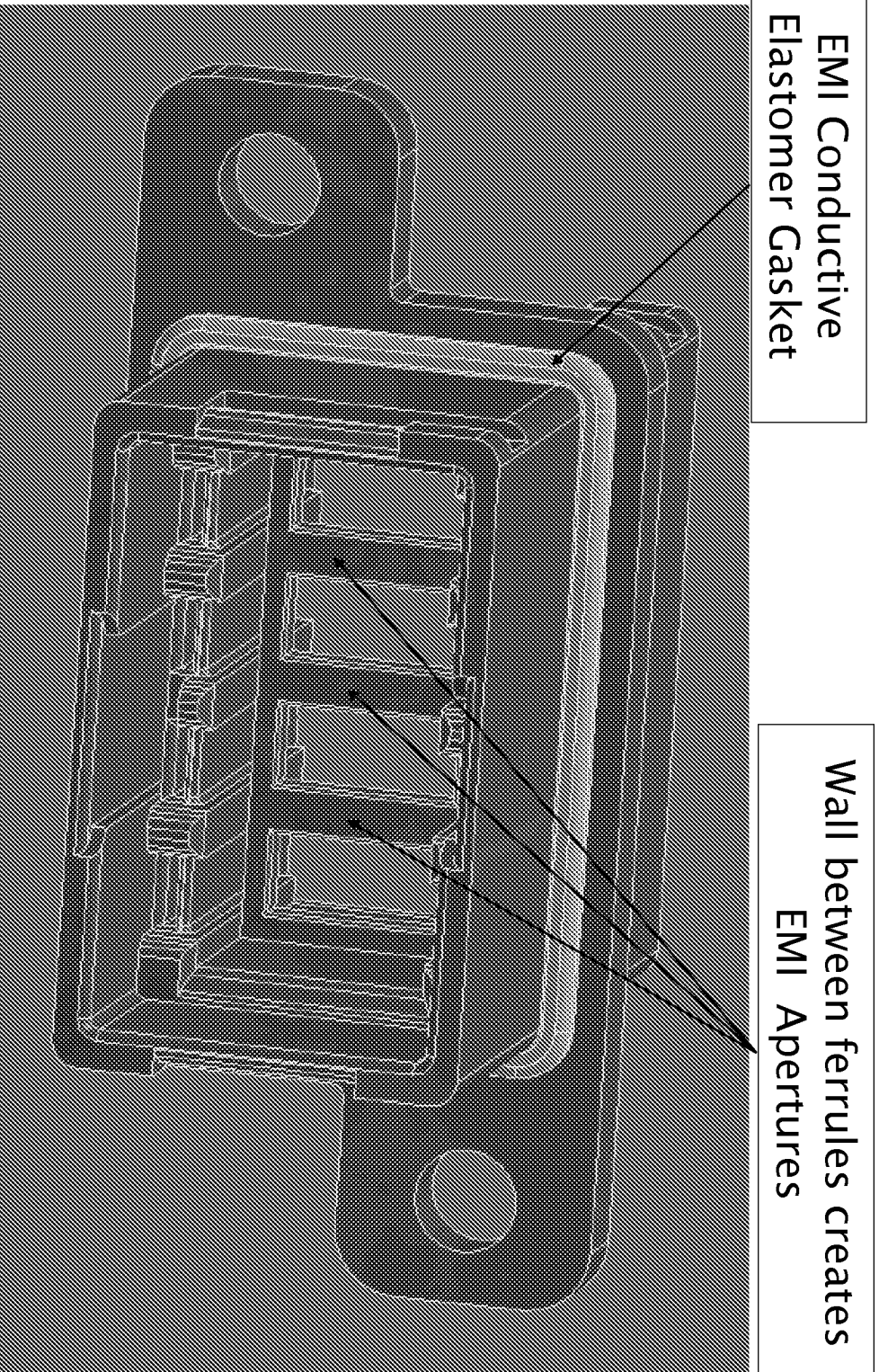
3. Circumstances Leading to the Invention

Traditionally EMI adapter requires both internal and external metal shielding to reduce electromagnetic interference susceptibility without impacting system speed. Typically a metal shield is mounted at the mating plane of the adapter. It is often preferred to construct the adapter out of plastic due to such reasons as design flexibility, better wear/debris creation, and cost. When the adapter is made of plastic, the metal plate forces the design to be made up of many separate components. In the 2x8 adapter currently made by US Conec, the adapter contains 34 separate molded components. The objective is to develop an EMI adapter to lower the cost and at the same time meeting the stated electromagnetic interference requirements.

4. Detailed Description of Invention (Include labeled drawing or photo and refer to it in the description. Include existing test reports, etc.):

This adapter design, shown in Figure 1, is molded in one-piece using an EMI conductive polymer. The center-wall apertures are designed with appropriate openings to physically accept MT footprint ferrules, and at the same time minimize electromagnetic leakage through the apertures. The adapter main body is designed with multiple thru slots for fine alignment of the Ferrule Holders, and with an external flange with groove to house an EMI elastomer gasket. The EMI gasket allows the adapter to be grounded electrically through contact with the panel it is mounted in. As shown in Figure 2, by designing the keyway in the adapter to align the ferrule holders on features that are located on the top and bottom of the ferrule holder, the adapter does not require vertical walls between the ferrule holders allowing for a tighter ferrule holder pitch. Figure 3 shows the alignment keys on the top and bottom of the ferrule holder. Figure 4 shows a transparent view of the adapter so the ferrule holders can be seen inserted into the adapter. As shown in Figure 5, by using the width of the keyway to control the location of the ferrule holder, the same feature can be used to control both of the mating connectors.

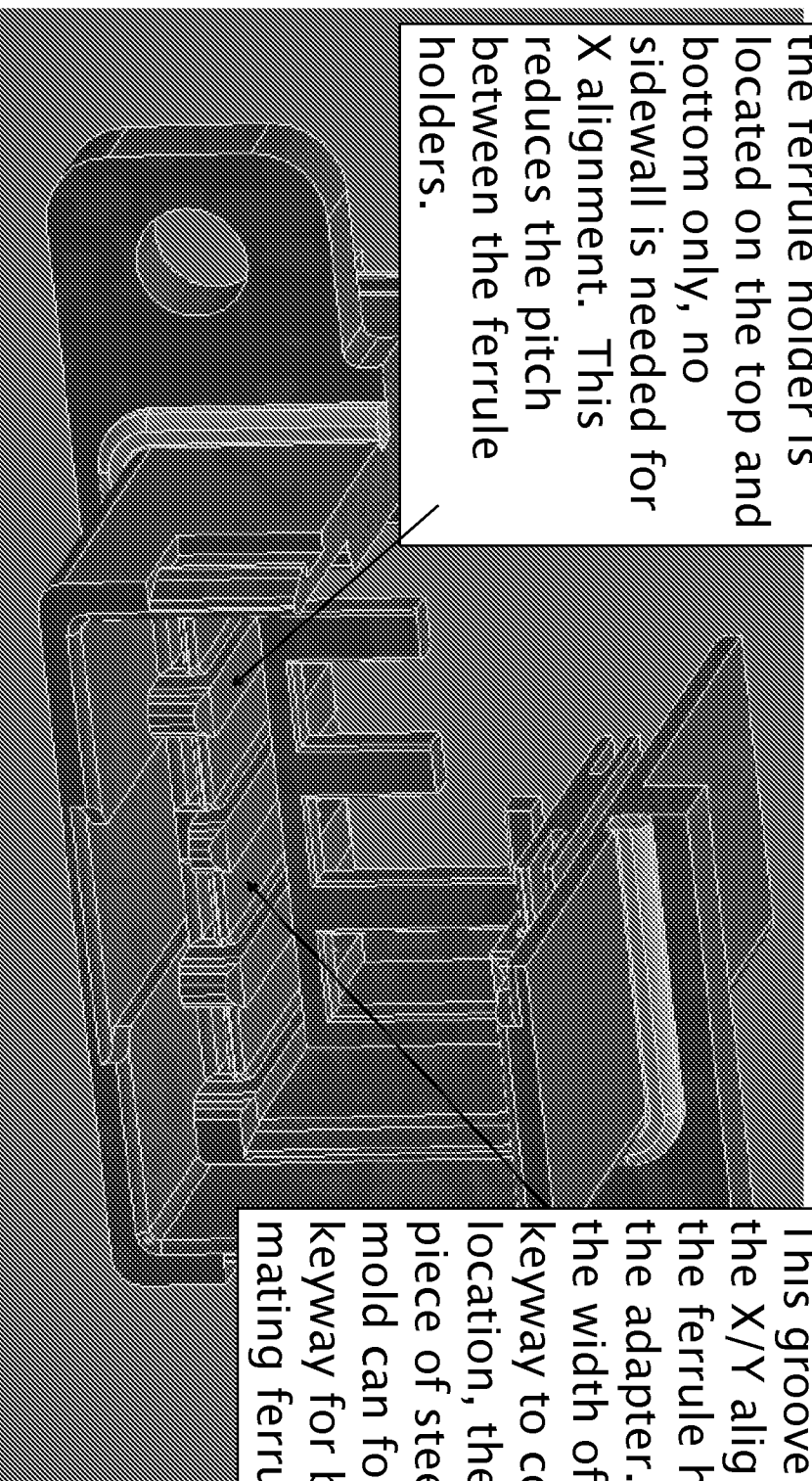
Figure 1: EMI Adapter, front view



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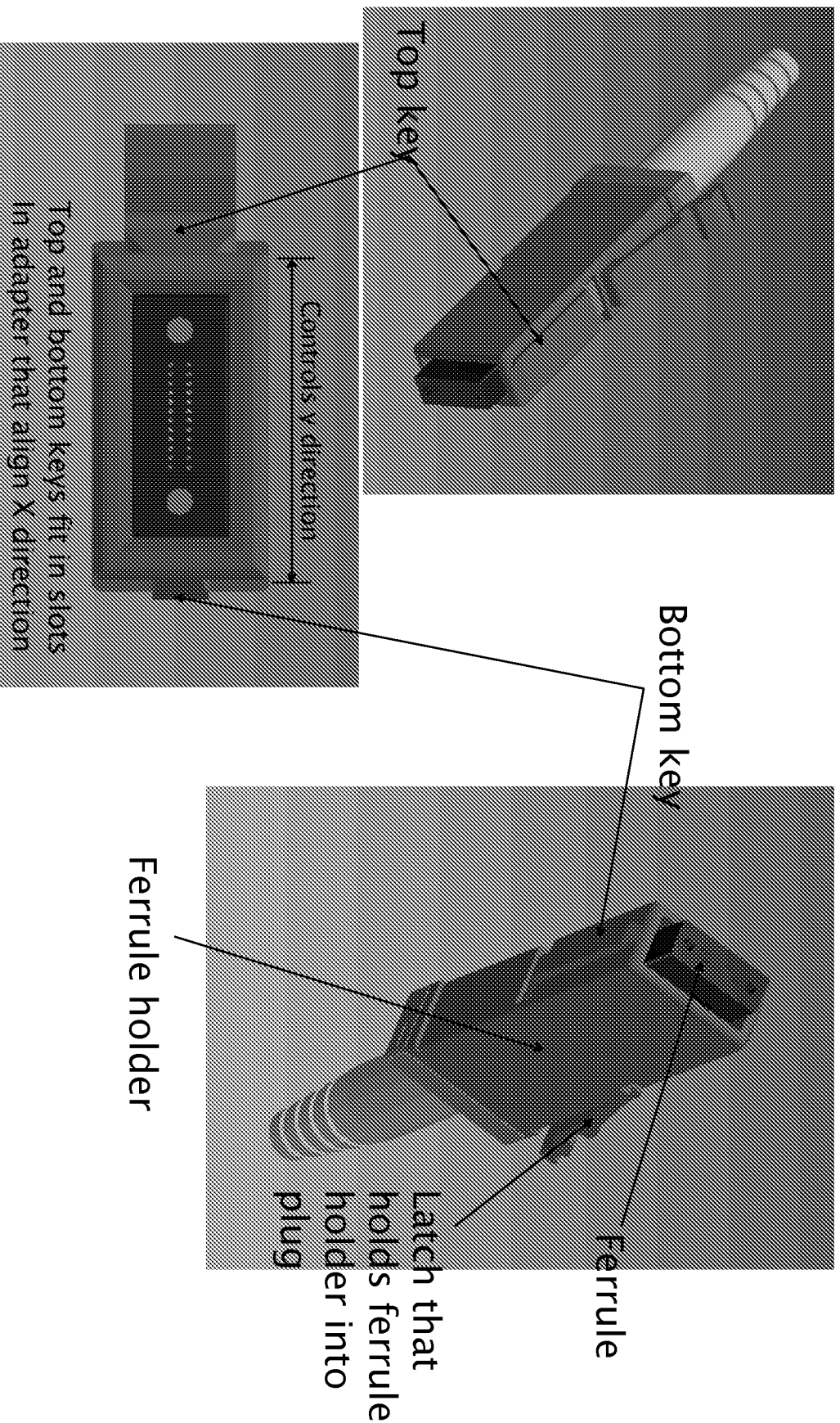
Figure 2: Cutout view of EMI Adapter

Because the key on the ferrule holder is located on the top and bottom only, no sidewall is needed for X alignment. This reduces the pitch between the ferrule holders.



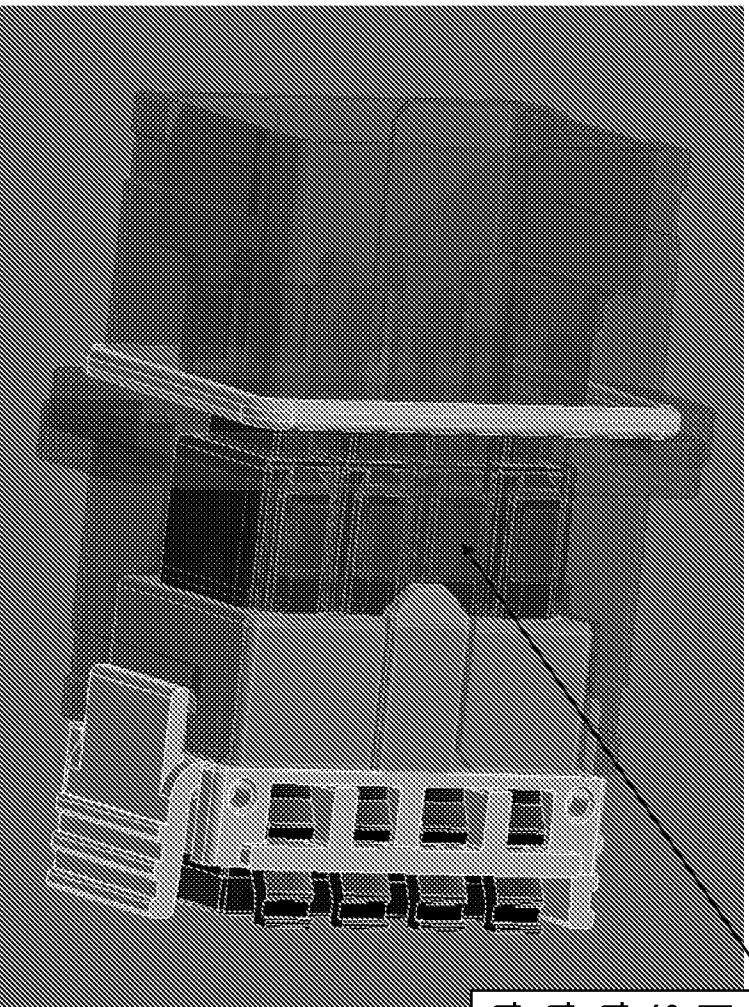
This groove controls the X/Y alignment of the ferrule holder in the adapter. By using the width of the keyway to control the location, the same piece of steel in the mold can form the keyway for both mating ferrule holders

Figure 3: Ferrules, ferrule holders, and plug



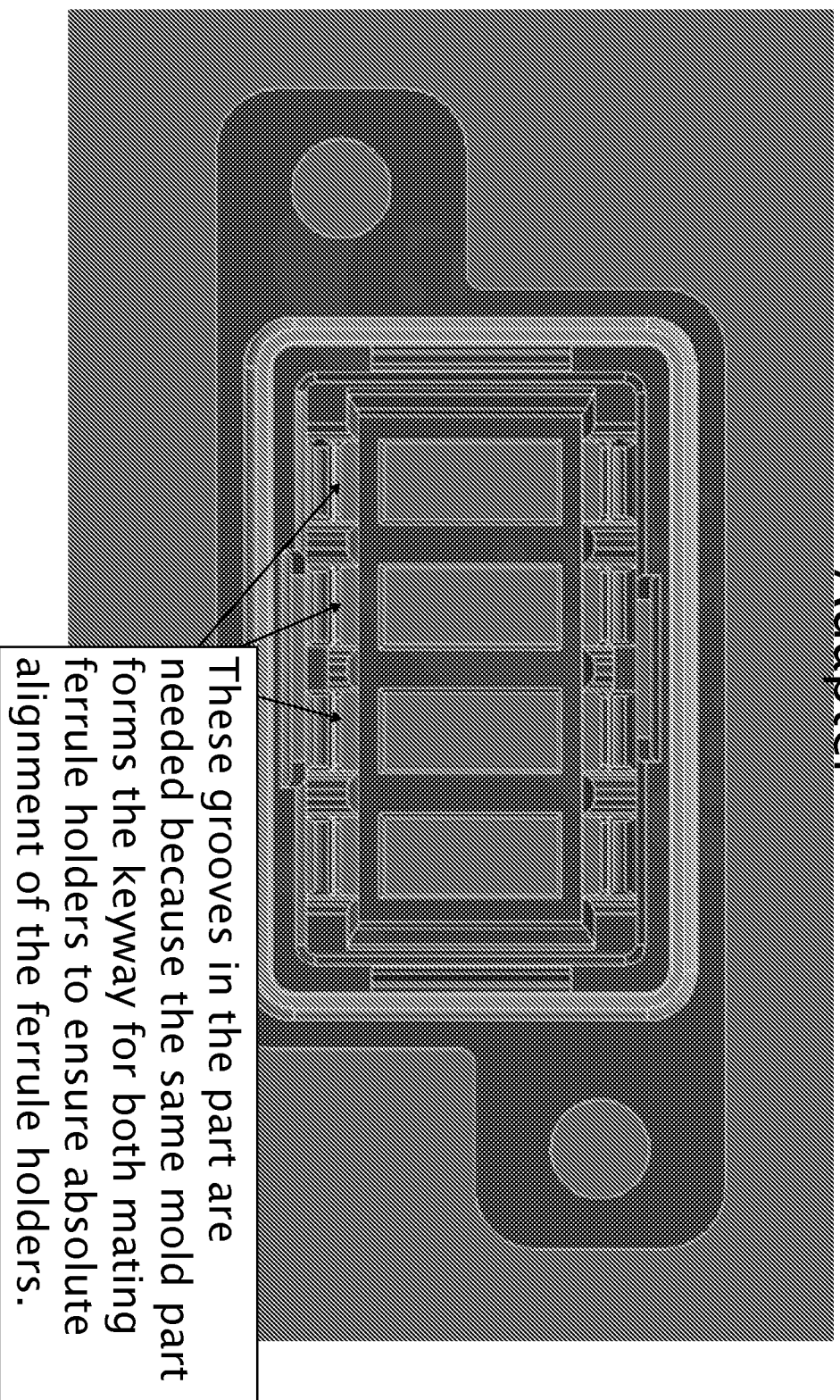
US Conec Proprietary

Figure 4: Transparent EMI Adapter



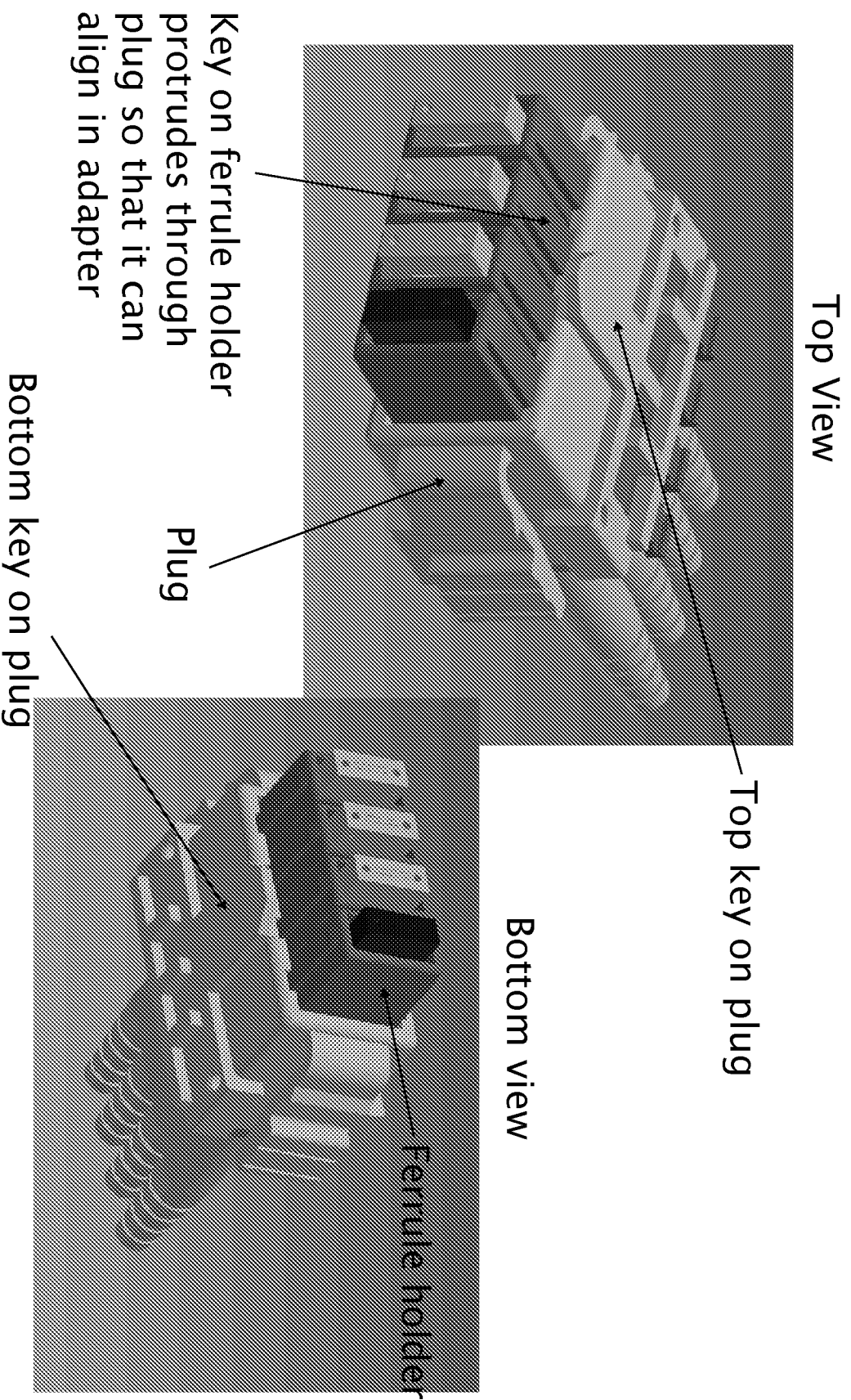
Fine alignment must occur in this area to prevent ferrule pins from stubbing as they enter the ferrule holes. (Less than 50 microns fit tolerance)

Figure 5: Front view of EMI Adapter



US Conec Proprietary

Figure 6: Plug with ferrule holders



US Conec Proprietary

5. Permissible Variations in the Invention

- The material selection for this adapter could be varied. For example, this one-piece adapter could be cast in zinc metal. If the EMI performance is not required, the adapter could be made of a injection molded polymer without the EMI filler.

RECORD OF INVENTION

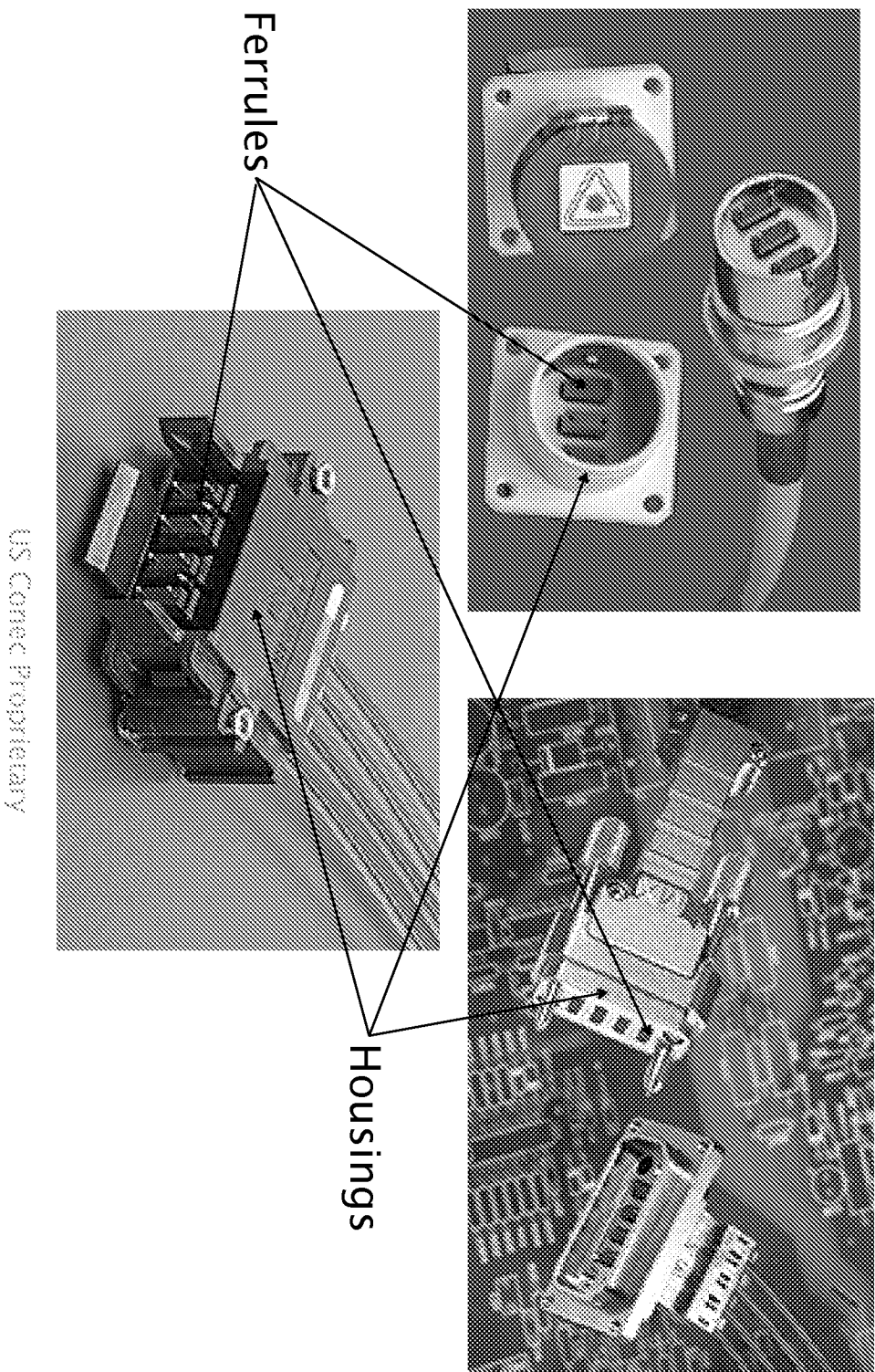
1. Name(s) of Inventor(s): Hiep Nguyen, Darrell Childers, Mike Hughes, Jillcha Wakjira, Joe Howard
2. Short Title of Invention: Alignment design for connector

US Conec Proprietary

3. Circumstances Leading to the Invention

There is a need for fiber optic connectors that contain ferrules that are ganged together with a tight pitch between ferrules. This type of design allows for many ferrules to be connected simultaneously and it takes up less space. In addition, it allows the ferrules to be organized with a prearranged fiber routing so that the complexity of connector routing is reduced for the user. As shown in Figure 1, typically, these ganged ferrule are mounted into a housing and the housings are mated to one another. The alignment between a mating pair of ferrules includes a tolerance stack-up that includes the true position of the ferrule relative to housing. By requiring a tight tolerance of the housing relative to the ferrule, the designs are expensive to maintain and expensive to scale to various ferrule counts. It is also difficult to scale to very large arrays within one housing due to the true position tolerance required for every ferrule and the larger distances.

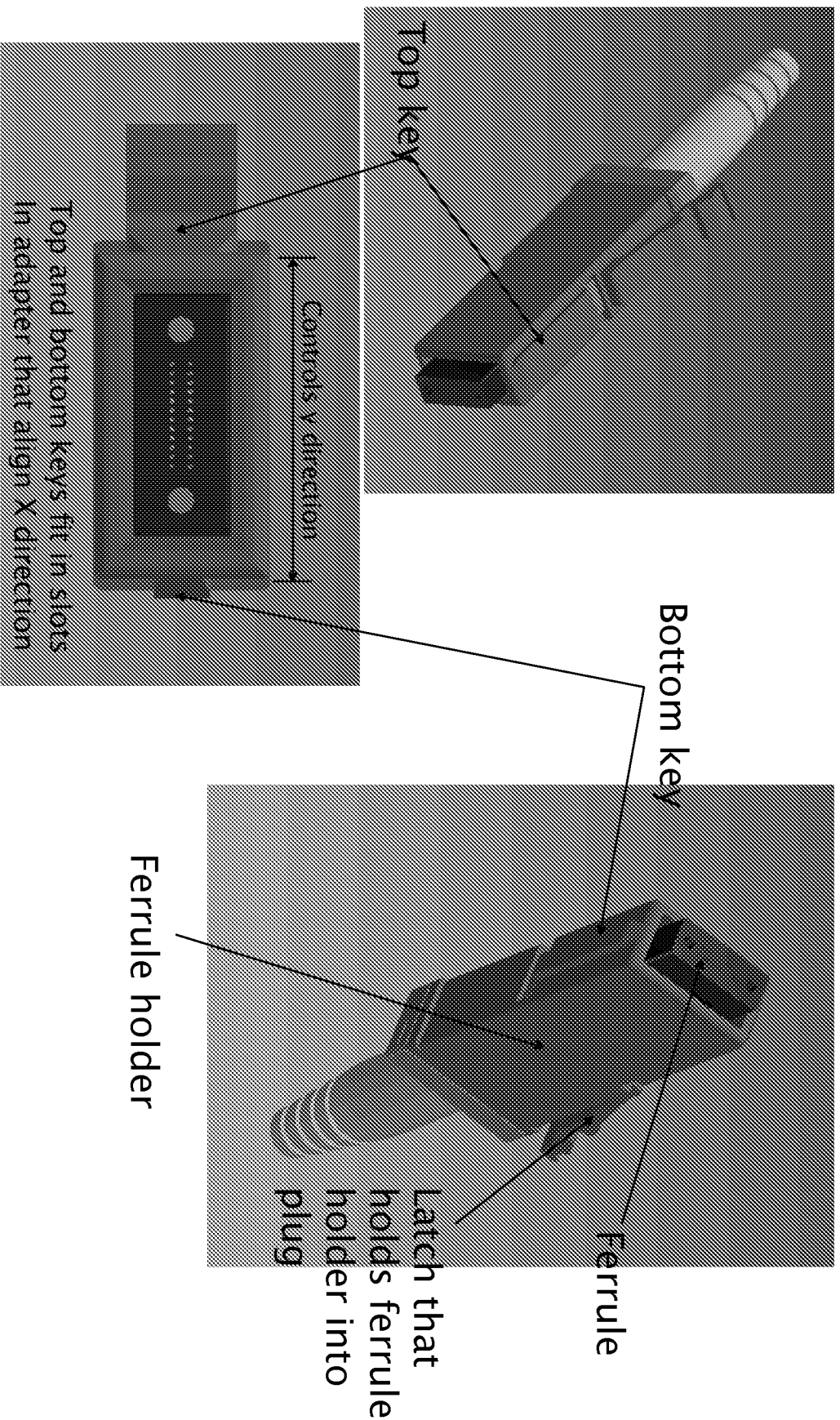
Figure 1: Typical ganged ferrule connectors



4. Detailed Description of Invention (Include labeled drawing or photo and refer to it in the description. Include existing test reports, etc.):

An alternative way to align the mating ferrules to each other, is to align the ferrule holders to one another through features in the adapter. Figure 2 shows a ferrule holder and ferrule. Rather than the sides of the ferrule holder aligning the ferrule holder to the adapter, the top and bottom key aligns the ferrule holder relative to the adapter in the x direction. The orientation of the ferrule holder in the plug and the adapter is controlled by the width difference between the top and the bottom key. The height of the ferrule holder aligns the ferrule holder in the y direction. As shown in Figure 3, the mechanism that gangs the ferrule holders together is called a plug. The ferrule holders protrude through the plug so the ferrule holder features can be aligned in the adapter. The alignment in the X and Y directions between the ferrule holder and the adapter are maintained within 100 microns, preferably within 50 microns. The adapter features that align the plug and the ferrules holders to the adapter are shown in Figure 4. Figure 5 shows a front view of the ferrule holder and adapter and the surface that align one to another. The fit of the ferrule holders within the plug is intentionally loose so as to not over constrain the ferrule holders in the adapter (greater than 100 microns). The groove within the adapter that aligns the ferrule holders is one continuous feature for both sides of the adapter and the mating ferrule holders. By making the groove one continuous feature for both sides, the alignment the mating ferrule holders is guaranteed. The size of the groove is critical but the true position of the alignment feature relative to the adapter-to-plug alignment feature is not critical. By using this alignment mechanism, large arrays of ferrule holders can be manufactured. Only the size of the alignment mechanism in the ferrule holder and the size of the alignment mechanism in the adapter must be maintained. The true position tolerances are significantly reduced. A cross section of the assembly is shown in Figure 6.

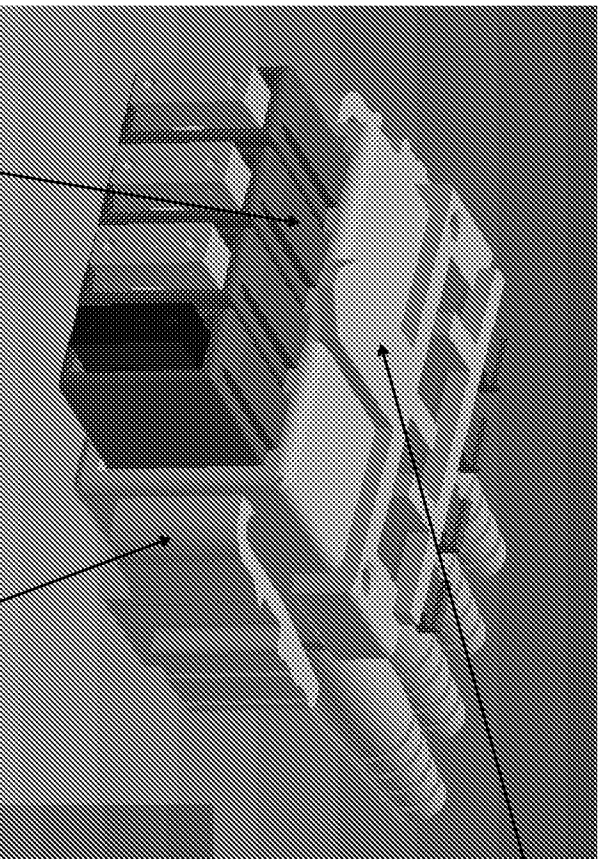
Figure 2: Ferrules, ferrule holders, and plug



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Figure 3: Plug with ferrule holders

Top View



Key on ferrule holder
protrudes through
plug so that it can
align in adapter

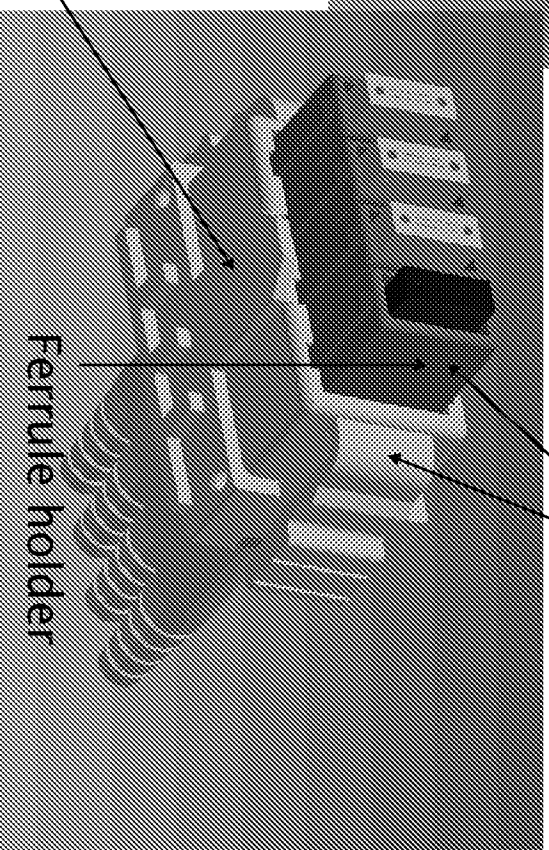
Plug

Bottom key on plug

Top key on plug

Bottom view

True position
between the
plug and the
ferrule holders is
not critical



Ferrule holder

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Figure 4: Cutout view of Adapter

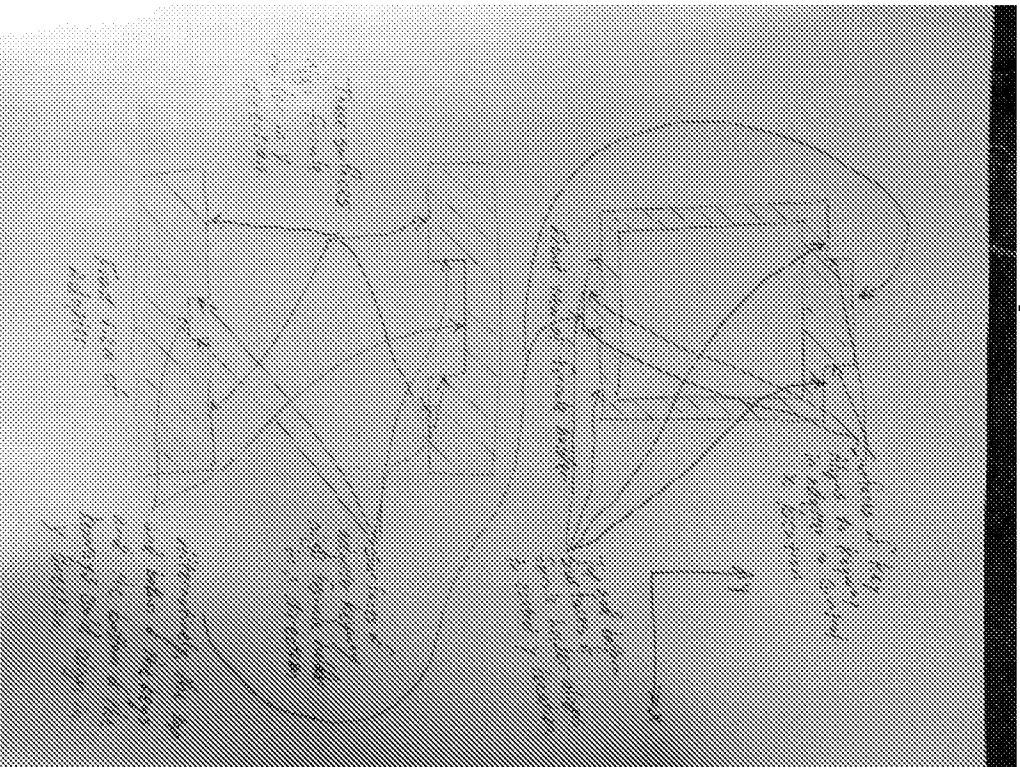
Because the key on the ferrule holder is located on the top and bottom only, no sidewall is needed for X alignment. This reduces the pitch between the ferrule holders.

This region controls the X/Y alignment of the ferrule holder in the adapter. By using the width of the keyway to control the location, the same piece of steel in the mold can form the keyway for both mating ferrule holders

True position between ferrule holder groove and plug alignment features is not critical

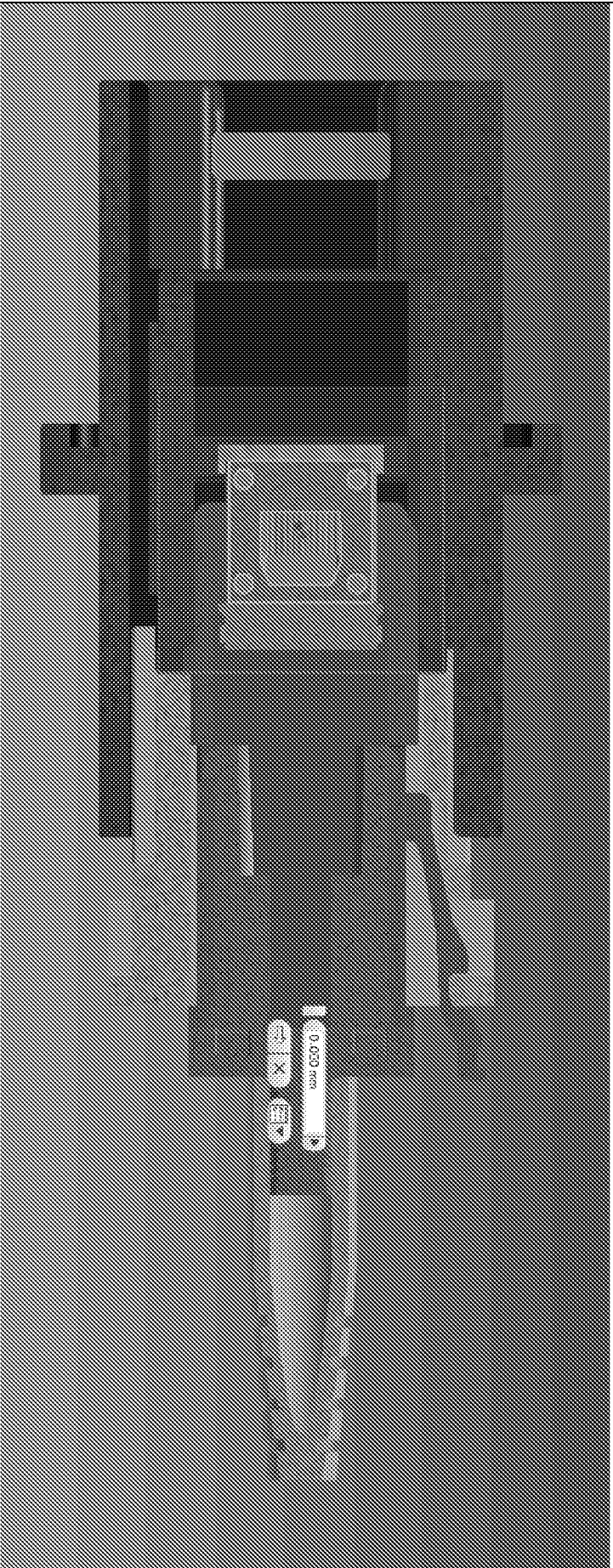
Keyway to align the plug to the adapter

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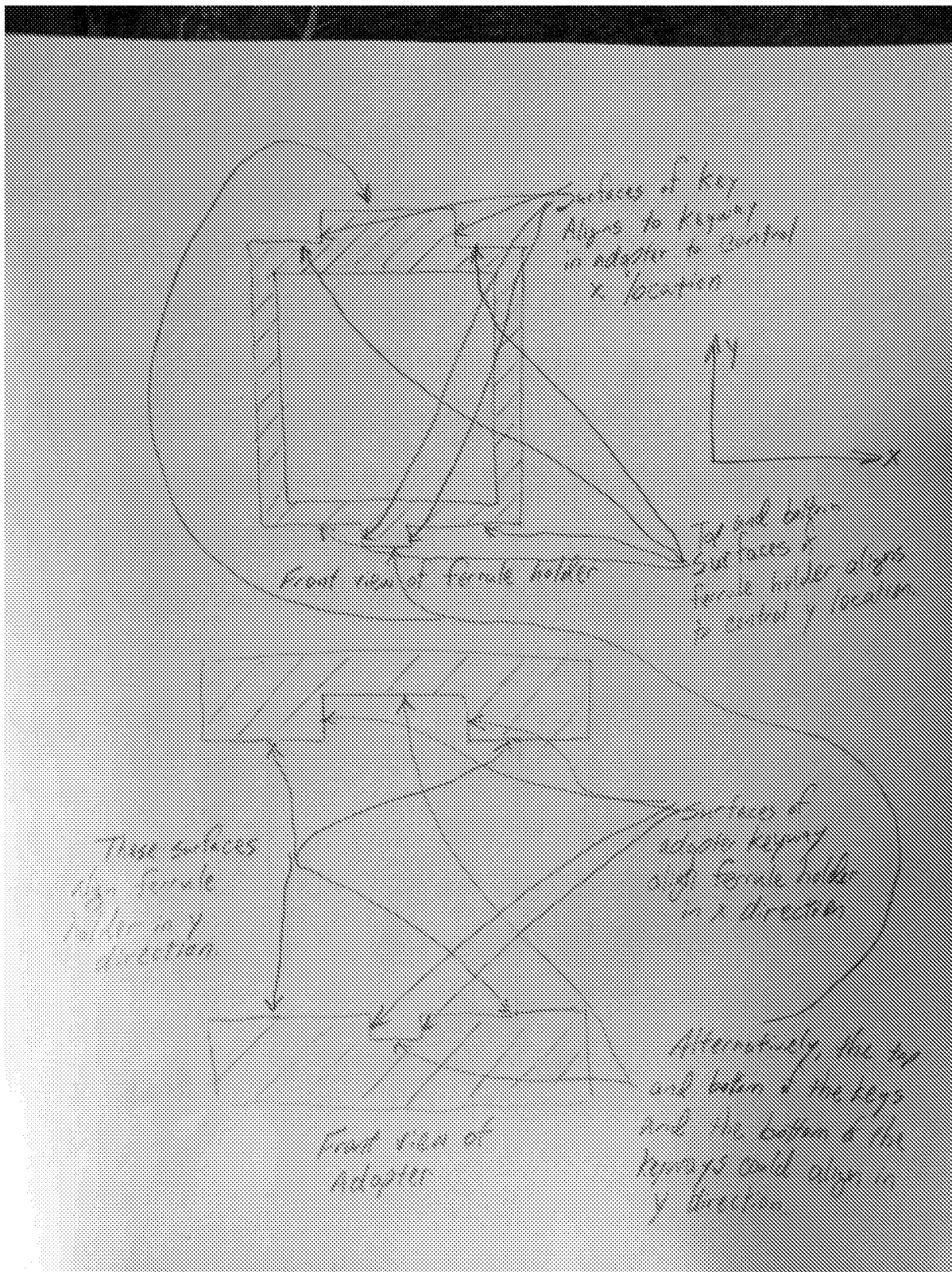
Figure 5: Cross section of the assembly



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5. Permissible Variations in the Invention

- Instead of the ferrule holder being aligned in the y direction by the height of the ferrule holder, the ferrule holder could be aligned by the top and the bottom of the keys.
- In order to eliminate the need for walls in the adapter between ferrule holders, it is important that the alignment features for the ferrule holder are located on the top and bottom of the ferrule holder.
- The shape of the keys are rectangular but could be other shapes such as semi-circular,



Provisional Application for Patent Cover Sheet This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c)					
Inventor(s)					
Inventor 1					Remove
Given Name	Middle Name	Family Name	City	State	Country i
Hiep		Nguyen	Fort Mill	SC	US
Inventor 2					Remove
Given Name	Middle Name	Family Name	City	State	Country i
Darrell	R.	Childers	Hickory	NC	US
Inventor 3					Remove
Given Name	Middle Name	Family Name	City	State	Country i
Michael	E.	Hughes	Hickory	NC	US
Inventor 4					Remove
Given Name	Middle Name	Family Name	City	State	Country i
Jillcha	F.	Wakjira	Hickory	NC	US
Inventor 5					Remove
Given Name	Middle Name	Family Name	City	State	Country i
Joseph	P.	Howard	Hickory	NC	US
All Inventors Must Be Listed – Additional Inventor Information blocks may be generated within this form by selecting the Add button.					
Title of Invention		Alignment Adapter and Alignment Design for a Connector Therefor			
Attorney Docket Number (if applicable)		USCO-053P			
Correspondence Address Direct all correspondence to (select one):					
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Customer Number			34203		

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☒ No.

☐ Yes, the name of the U.S. Government agency and the Government contract number are:

Entity Status Applicant claims small entity status under 37 CFR 1.27					
☐ Yes, applicant qualifies for small entity status under 37 CFR 1.27 ☒ No					
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Signature	/Michael L. Leetzow/			Date (YYYY-MM-DD)	2013-03-15
First Name	Michael	Last Name	Leetzow	Registration Number (If appropriate)	35932
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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
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8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
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Electronic Patent Application Fee Transmittal

Application Number:

Filing Date:

Title of Invention:

Alignment Adapter and Alignment Design for a Connector Therefor

First Named Inventor/Applicant Name:

Hiep Nguyen

Filer:

MICHAEL LEETZOW

Attorney Docket Number:

USCO-053P

Filed as Large Entity

Provisional Filing Fees

Description

Fee Code

Quantity

Amount

**Sub-Total in
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Basic Filing:

Provisional Application Filing

1005

1

250

250

Pages:

Claims:

Miscellaneous-Filing:

Petition:

Patent-Appeals-and-Interference:

Post-Allowance-and-Post-Issuance:

Extension-of-Time:

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Total in USD (\$)				250

Electronic Acknowledgement Receipt	
EFS ID:	15251660
Application Number:	61789499
International Application Number:	
Confirmation Number:	7041
Title of Invention:	Alignment Adapter and Alignment Design for a Connector Therefor
First Named Inventor/Applicant Name:	Hiep Nguyen
Customer Number:	34203
Filer:	MICHAEL LEETZOW
Filer Authorized By:	
Attorney Docket Number:	USCO-053P
Receipt Date:	15-MAR-2013
Filing Date:	
Time Stamp:	14:19:32
Application Type:	Provisional

Payment information:	
Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$250
RAM confirmation Number	1732
Deposit Account	
Authorized User	

File Listing:				
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part / zip (if appl.) Pages (if appl.)

1	Specification	USCO053PROV.pdf	2630526	no	21
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Warnings:					
Information:					
2	Provisional Cover Sheet (SB16)	ProvisionalSB0053.pdf	1060265	no	4
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Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	29296	no	2
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Warnings:					
Information:					
Total Files Size (in bytes):			3720087		
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