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(54) **DEDICATED USB POWER PORTS COUPLED WITH A MULTI-PORT USB POWERED HUB**

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(57)   **ABSTRACT**
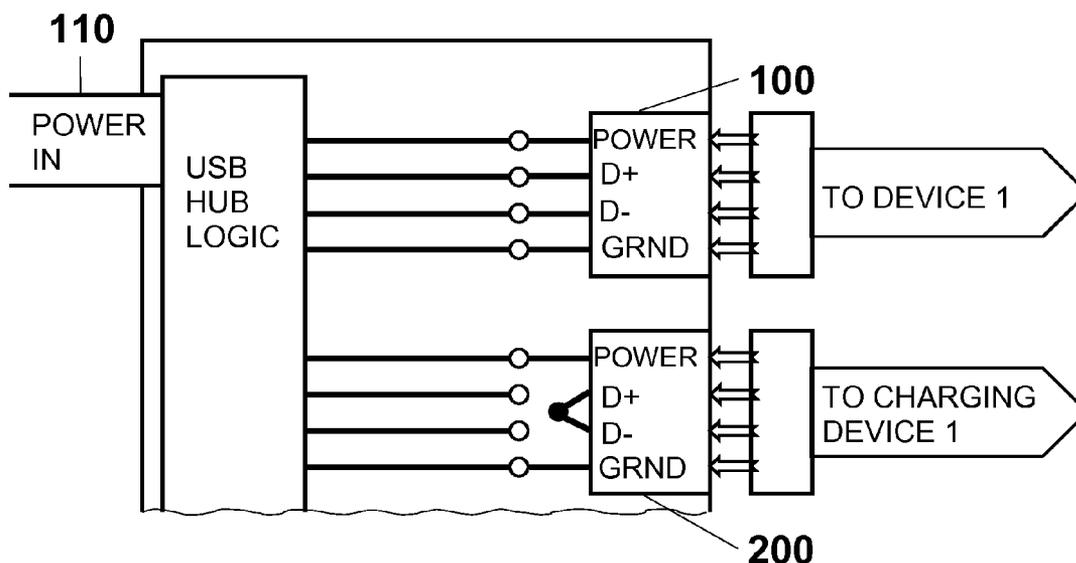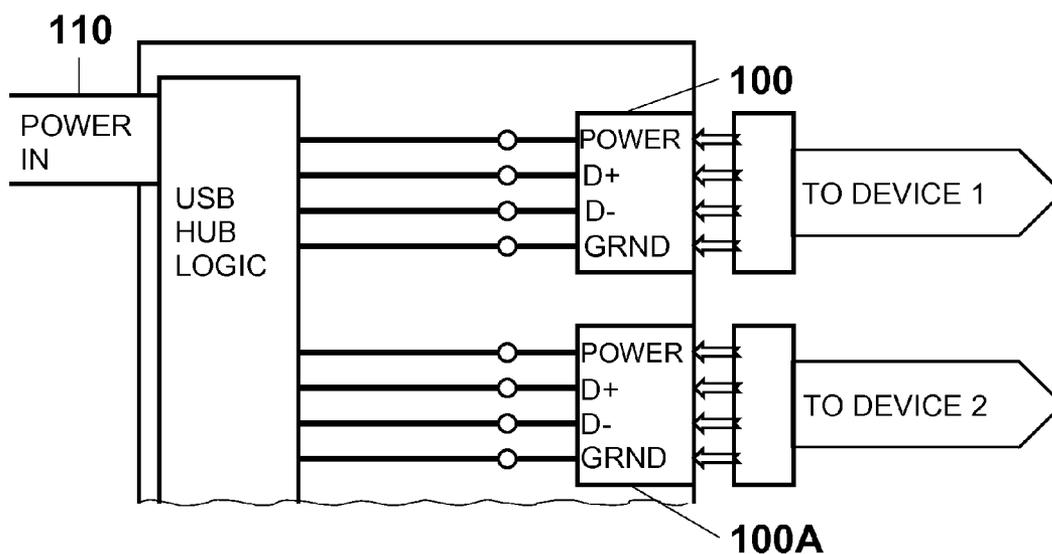
A dedicated power port (DPP) providing 1 Amp (A) or more of current enables a user to charge mobile tablet and communication like devices (TCD) without the use of additional software or circuitry. The DPP is coupled with a multi-port USB powered hub (MPH), the user can simultaneously charge TCDs via the dedicated port while peripheral devices, which are connected to non-dedicated USB ports, continue to function within industry specifications. Thereby addressing a limitation for viable charging solutions of modern day TCDs while simultaneously retaining the functionality and convenience of a MPH, all in one embodiment.

110

POWER
IN

USB
HUB
LOGIC

100

POWER
D+
D-
GRND

TO DEVICE 1

POWER
D+
D-
GRND

TO DEVICE 2

100A

FIG 1

PRIOR ART

200

USB
HUB
LOGIC

110

POWER
IN

211

212

POWER

212

D+

212

220

213

D-

213A

214

GRND

TO CHARGING
DEVICE

FIG 2

110

100

POWER
IN

USB
HUB
LOGIC

POWER
D+
D-
GRND

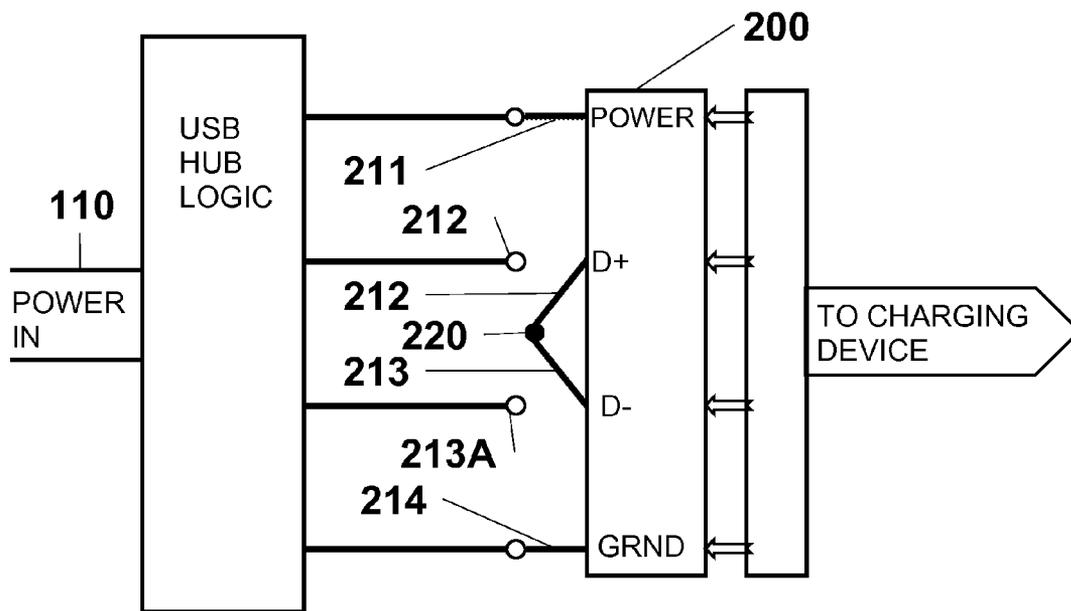TO DEVICE 1

POWER
D+
D-
GRND

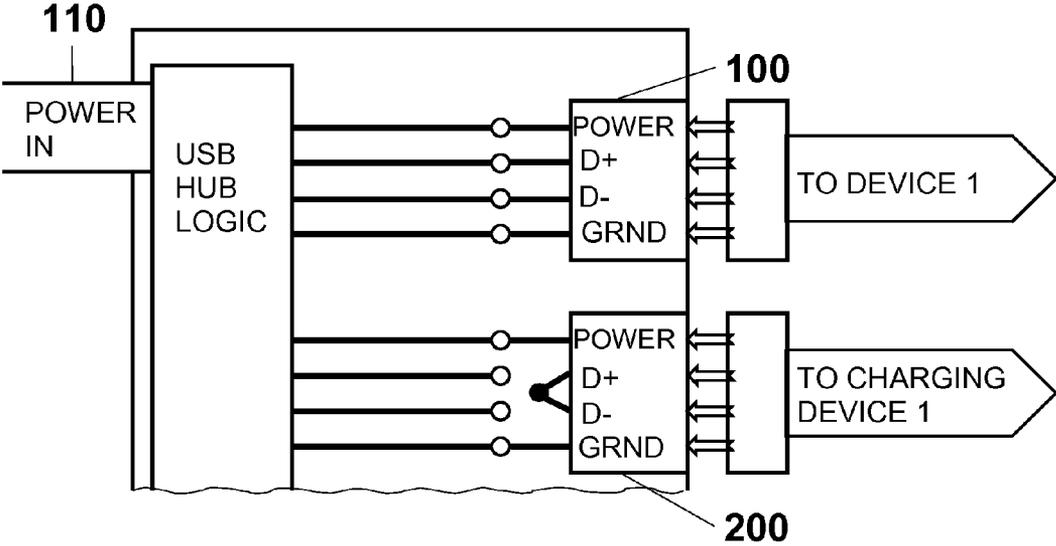TO CHARGING
DEVICE 1

200

FIG 3

DEDICATED USB POWER PORTS COUPLED WITH A MULTI-PORT USB POWERED HUB

BACKGROUND

[0001] The patent field is related to the charging of portable electronic devices via a multi-port Universal Serial Bus (USB) powered hub. Considering USB properties as discussed in Terry Remple's document Battery Charging Specifications revision 1.1 Apr. 15, 2009, ports use differential data pins, referred to as D+ and D−, to determine if a device is connected to a USB port. In addition, the differential data pins are used to establish and maintain communications or data transfer (hereafter referred to as communications) between peripheral devices and to determine if a port is empty. Typically detection is achieved by utilizing the D+ and D− pins (hereafter, referred to as data pins) together rather than independently. Thus multi-port USB powered hubs provide 0.5 Amp (A) (USB 2.0), or 0.9 A (USB 3.0), of charging current to each port. In contrast, unpowered hubs must be connected to a host apparatus to provide 0.5 A of charging current, which is shared across all ports. Present day mobile tablet and communication like devices (hereafter, referred to as TCD), for example; IPhone, IPad, Slate, Galaxy, Rim, BlackBerry, specify 1 A or more of current on each individual USB port to charge effectively. Previous USB hubs do not satisfy the specification of 1 A or more of charging current, without the intervention of additional software or circuitry. Thus a limitation of readily available charging options which include communications between peripherals (mouse, keyboard, printer) is created. The following is a tabulation of some prior art that is relevant to these limitations:

Patented References:

Patent #	Kind Code	Issue Date	Patentee
US RE42,385	E	2011 May 24	Wong et al
US 2011/0025262	A1	2011 Feb. 03	Fischer et al
U.S. Pat. No. 7,623,355	B2	2009 Nov. 24	Lambert et al
U.S. Pat. No. 7,320,077	B2	2008 Jan. 15	Kim
US 2008/0007212	A1	2008 Jan. 10	Theytaz et al

NonPatented Literature Documents:

Author	Title	Revision	Date of Publication
Terry Remple	Battery Charging Specifications	revision 1.1	Apr. 15, 2009

U.S. Pat. No. 7,320,077B2 Power Supply Controlling Apparatus of a Device Connected to a Serial Bus by Kim which depicts the normal functionality of a USB hub and active data pins. However because of the 0.5 A USB output, it will not be able to effectively charge present day TCDs. A similar occurrence is evident in U.S. Pat. No. RE42,385E Universal USB Charging Accessory by Wong et al and U.S. Pat. No. 7,623,355B2 Extended Universal Serial Bus Connectivity by Lambert et al. Although both have data pin communications but not the essential proprietary software installation, the USB ports do not provide 1 A or more of current nor recognize present day TCDs. Charging devices satisfying the current specifications of TCDs through hardware and/or profiles, such as US Patent # 2011/0025262A1 Multifunctional Charging System and Method by Fisher et al and US Patent #

2008/0007212A1 Universal Charger by Theytaz et al, do not provide the data communications functionality between peripherals, network devices, or computers.

BRIEF DESCRIPTION OF THE DRAWINGS

[0002] FIG. 1 (Prior art) Multi-port USB powered hub without dedicated power ports
[0003] FIG. 2 Simplified view of a single dedicated USB power port
[0004] FIG. 3 Dedicated USB power port coupled with a multi-port USB powered hub

BRIEF SUMMARY OF INVENTION

[0005] Dedicated Universal Serial Bus (USB) power ports coupled with a multi-port USB powered hub comprise of at least one dedicated USB power port and one or more non-dedicated USB ports with the functionality of a multi-port USB powered hub (hereafter, referred to as a MPH).
[0006] A dedicate USB power port (hereafter, referred to as DPP) solely used for providing charging current to a device is created by disabling communication and data transfer (communications) between the connected device and the USB port. It is configured by removing the D+ and D− pins (data pins) from the circuit board and re-soldering them in a crossed manner inside the USB port housing, effectively shorting them. Thus eliciting an output of 1 Amp (A) or more of current.
[0007] The process of combining the DPP with a MPH enables users to fulfill a requirement of providing 1 A or more of current for charging mobile tablet and communication like devices (TCD), consideration for legacy devices, and utilizing the MPH functionality for peripheral communications. All within one embodiment.

DETAILED DESCRIPTION

[0008] Considering the various types of Universal Serial Bus (USB) ports, the basic properties of a port pin configuration, contains four pins which are used when a device is connected to a USB port. The first pin provides current (power) to the USB port and subsequently any device connected to the port. Pin 2 and pin 3 are differential data pins (data pins) often referred to as D+ and D− used when communication and data transfer (communications) takes place between the USB port and a connected device. The fourth pin is the ground or current return for the port.
[0009] Multi-port USB powered hubs (MPH) contain a plurality of USB ports in their entirety. FIG. 1 (prior art) illustrates two identical ports 100,100A. Through each USB port data and current are able to actively flow between the port and connected device. USB ports use the data pins to determine if a device is connected to a USB port, establish and maintain communications with peripheral devices (mouse, keyboard, printer), and determine if the port is empty. Typically the determination is achieved by utilizing the data pins together rather than independently. MPHs power adaptors (power in 110) provide 0.5 Amps (A) (via USB 2.0) and 0.9 A (via USB 3.0) of current to all ports for charging of a device.
[0010] In contrast unpowered hubs must be connected to a host apparatus which share 0.5 A of charging current across all ports (not illustrated). Present day technology such as mobile tablet and communication like devices (TCD) specify 1 A or more of current on the individual USB port to charge effectively. To charge devices with these limitations in place,

additional circuitry or special software must be installed on a host apparatus to allow the ports to charge the device. If the software is not present, the device will not charge. The alternative option of using a wall charger often times is not feasible nor convenient:

[0011] As a detailed illustration, when a TCD is connected to the USB port **100**, a handshake occurs between the host device and TCD. The handshake determines the maximum current available to charge the device. Due to communications taking place via the data pins, sufficient current will not be provided without the intervention of installed software or circuitry.

[0012] FIG. **2** To provide sufficient current for a TCD to charge effectively, a USB port is modified by stopping communications. One process is first removing (unsoldering) the D+ **212** and D– **213** pins from its circuit board at **212A, 213A**. Then re-soldering the same pins **212, 213** together in a crossed manner **220** within the USB housing, to create a dedicated USB power port (DPP). The power **211** and ground **214** pins remain connected to the circuit board. The crossing of pins **212** and **213** results in a short of the data pins therefore disabling (stopping) communications between the device connected to the port and the host USB port. Without communication, the host port is then able to provide 1 A or more of charging current to the connected device.

[0013] As a detailed illustration, when a TCD is connected to a DPP **200**, a handshake between the host port and TCD is also attempted. However with the data pins shorted **220**, the communications cannot take place. The host device determines no communication is possible and provides the port with the maximum charging current available. The current is provided by the power adaptor (power in **110**) which is able to supply 1 A or more of current to each port. Thereby allowing the TCD to receive the required current to effectively charge without the installation of additional software or circuitry.

[0014] FIG. **3** (To be used as front page) The process of creating DPP can be repeated in multiple USB ports based upon the requirements of the user. DPPs within a MPH pro-

vides the capability of independently charging TCDs via dedicated ports **200** and simultaneously maintaining communications between peripherals via other non-dedicated USB ports **100** in one embodiment. Use of the device will not require additional installation of software or circuitry to allow for the charging of TCDs or communications between the peripherals. The charging current is provided by the power adaptor (power in **110**) which is able to supply 1 A or more of current to each port. Furthermore the device incorporates legacy devices which do not have the same re-charging specifications as those of present day technology.

[0015] It should be understood that various changes and modifications of the embodiments shown in the drawings and described in the specifications may be made within the spirit and scope of the present invention. Accordingly, it is intended that all matter contained in the descriptions and shown in the accompanying drawings be interpreted in an illustrative and not a limiting sense. The invention is limited only as defined in claims and the equivalents thereto.

What I claim is:

1. A process for charging electronic devices, comprising of one or more USB ports which are solely used for providing current coupled with a multi-port USB powered hub.

2. The said process of claim **1** wherein said ports used solely for providing current; provide 1 amp or more of current output from each port to attached devices.

3. The said process of claim **2** further comprises of no requirement of additional circuitry or software to be installed on a host apparatus to charge a device attached to the ports solely used for providing current.

4. The said process of claim **1** further comprises of a multi-port USB powered hub with one or more USB ports which are not solely used to provide current.

5. The said process of claim **1** wherein said charging of electronic devices and multi-port USB powered hub usage can occur independently and simultaneously in one embodiment.

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