

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
22 February 2007 (22.02.2007)

PCT

(10) International Publication Number
WO 2007/020470 A1

(51) International Patent Classification:

G09F 3/20 (2006.01) G09F 9/00 (2006.01)
G07G 1/14 (2006.01) A47F 10/02 (2006.01)
G06K 17/00 (2006.01)

(21) International Application Number:

PCT/GB2006/003124

(22) International Filing Date: 21 August 2006 (21.08.2006)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

0517053.5 19 August 2005 (19.08.2005) GB

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

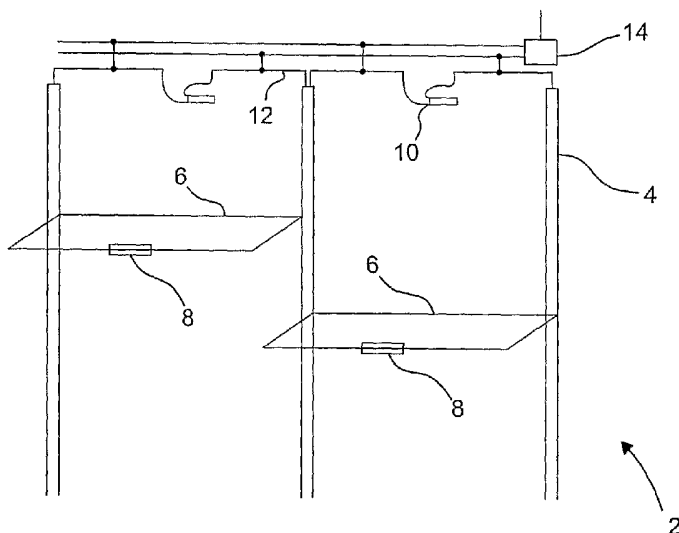
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: SHELVING



(57) Abstract: A shelving system (2) comprising a support structure (4), one or more shelves (6) mounted on the support structure, at least one networkable electronic device (8) mounted on a shelf or the support structure. The system also includes conductors (12) or power supply and data transmission to said networkable device. One or more of the conductors provide a shared line for power supply and data transmission.

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SHELVING

FIELD OF THE INVENTION

5 This invention relates to shelving. More specifically it relates to shelving systems comprising network devices, for example display, audio or telecommunication devices or processors.

BACKGROUND OF THE INVENTION

10 There are many examples of shelving systems, for example display arrangements in stores, which incorporate lighting. Generally the power is provided to lamps mounted on the shelves through an extra-low voltage supply (i.e. a supply not exceeding 50 volts AC or 120 volts DC). In our earlier
15 International patent application WO03/063655 we disclose shelving systems with integral power supply lines (e.g. for extra-low voltage supplies) for electrical components, such as lamps, mounted on the shelf structure.

20 More recently, there is a growing desire to provide shelving systems incorporating electronic devices, particularly networked electronic devices such as displays and audio devices. For example, EP0558305 describes a shelving system including electronic shelf edge displays that
25 can be used, for example, to display information (e.g. price) about items on the shelves, useful in supermarket and warehouse environments.

30 Such networked devices require power supply lines and data transmission lines, with two lines (positive and negative polarity) for power supply and two lines for data transmission.

SUMMARY OF THE INVENTION

The present invention proposes, in general terms, to transmit data to networkable devices on shelving systems over a power supply line (e.g. an extra-low voltage line) that also supplies power to the networkable device.

The present invention provides a shelving system comprising a support structure, one or more shelves mounted on the support structure, at least one networkable electronic device mounted on a shelf or the support structure and conductors for power supply and data transmission to said networkable device, wherein one or more of said conductors provide a shared line for power supply and data transmission.

By using a shared line in this way, transmitting data over power lines (e.g. extra-low voltage power lines) for the networkable device, the number of connections and the number of conductors necessary within the system can be kept to a minimum. This simplifies installation and helps to minimise costs.

Power line networking is of itself well known in the context of home and small office environments using the mains wiring in a building. The HomePlug Powerline Alliance have developed and published a specification, the "HomePlug 1.0 specification", to facilitate such networking for data transmission. The HomePlug specification provides functions, operations and interface characteristics for high-speed networking based on OFDM (Orthogonal Frequency Division Multiplexing) modulation over power lines.

The present invention can, in preferred embodiments, adopt the same approach used by HomePlug for transmission of data.

5 The conductors for the combined power supply and data transmission can be incorporated within the shelving system in the manner described in WO03/063655.

10 The power supply wiring of the shelving system, which will typically be for an extra-low voltage supply, preferably receives data from an external source, for example a networked computer. This source may be connected to the power lines via a receiver (e.g. a modem or transceiver) that receives data from the external source and transmits it on to
15 the networkable device on the shelving system over the shared line.

 The data transmission from the external source may itself be over power supply wiring (using for example a
20 conventional HomePlug system) or via a wired (e.g. Ethernet) or wireless telecommunications network.

 Particularly where the shelving system is to be installed in a commercial building (e.g. a supermarket or
25 warehouse), the transmission of data to the shelving system can conveniently be accomplished using the mains wiring within the building. Typically in a commercial building, the mains supply will be three-phase, with each phase serving distinct parts of the building. In this case, the same or
30 different data signals can be transmitted over each phase.

 A combination of different ones of the communication paths described above may be used.

Preferably, the shelving system will include multiple networkable devices mounted on shelves and/or the support structure and connected to the shared line, which then serves as a common data transmission line for all of the devices. In this case, each of said networkable devices may be individually addressable so that data transmitted over the shared line can be addressed to individual ones of said devices if desired.

The data transmission may be both to and from the networkable device.

BRIEF DESCRIPTION OF THE DRAWINGS

An embodiment of the invention is described below, by way of example, with reference to the accompanying drawings, in which:

Figure 1 schematically shows a shelving system according to an embodiment of the present invention;

Figure 2 schematically shows an installation comprising a series of shelving systems in accordance with embodiments of the present invention; and

Figure 3 schematically shows another installation comprising a series of shelving systems according to embodiments of the present invention.

DETAILED DESCRIPTION OF EMBODIMENTS

The shelving system 2 illustrated in figure 1 comprises a support structure 4, in this case a series of upright supports, and a plurality of shelves 6 mounted on the support

structure. For simplicity, only two shelves 6 are shown in the figure, but normally more shelves would be employed, mounted on the support structure one above the other and side-to-side. Back-to-back arrangements of shelves are also envisaged.

Each shelf has mounted on it a networkable electronic device 8. The device may for example be a display unit for displaying information, including price for example, about items on the shelf, for displaying advertising or other messages for instance. Additionally or alternatively, the device may be an audio device for broadcasting messages or sensors for monitoring stock levels or conditions (e.g. temperature) for example. Each shelf may have more than one such device mounted on it. Device may also be mounted on the supporting structure.

The shelf-mounted devices are connected to an extra-low voltage power supply (in this example a 12v supply) 10, by conductors 12 that are housed within the upright support members 4 and conductors (not shown) within or on the underside of the shelf 6. The arrangement of conductors can be as described in our International patent application WO03/063655.

In accordance with the present invention, the power supply conductors are also used to transmit data between a transceiver 14 and the networkable devices 8.

The transceiver 14 receives data signals from an external source (for example and networked computer serving as a central controller for e.g. displays on the shelving - not shown) and transmits it over the power supply conductors

12 to the networkable devices 8. In the case where two-way data communication is needed, the transceiver 14 receives data signals, again over the power supply conductors 12, from the networkable devices 8 for onward transmission to the external source or one or more other networked devices.

The data may be transmitted over the extra-low voltage power lines using conventional communications protocols (e.g. TCP/IP). The transport of the data over the power lines may be in accordance with the HomePlug 1.0 specification or similar using OFDM modulation or other suitable modulation of a carrier signal on the power line.

The communication link between the transceiver 14 and the remote, external data source ('external' in the sense of not part of the shelving system) may be via the mains power supply of the building in which the shelving system is installed (which may also power the extra-low voltage supply via an appropriate transformer). Alternatively, the transceiver may be connected to a wired (Ethernet) or wireless (e.g. WiFi) telecommunications network.

Figure 2 shows an installation, as might be used in a supermarket or warehouse for example, of multiple shelving systems 2 networked to a remote server 20 that controls and transmits data to the networkable electronic devices (not shown) associated with the shelving systems.

The shelving systems 2 may be as described above with reference to Fig. 1. The server 20 may be located within the supermarket or warehouse and the term "remote" is intended to mean only that the server 20 is not part of the shelving systems themselves. Alternatively, however, the server 20

may be located elsewhere, so long as a communication link can be established.

The example of Fig. 2 shows an installation in a commercial building with a three-phase power supply 22. Each phase (22a, 22b, 22c) supplying a different area within the building, providing power to shelving systems (amongst other things) in those respective building areas. In figure 2, only one shelving system 2 per phase is shown, but in practice many more shelving systems may be fed by each phase of the power supply 22.

Each phase (22a, 22b, 22c) of the power supply 22 also serves as part of a transmission path for communication of data between the shelving systems 2 and the central server 20. A single transceiver 24, for example a HomePlug device, is connected to all three phases of the power supply 22 remote from the shelving systems 2. Each shelving system also includes a transceiver 14, as described above in relation to Fig. 1.

The remote transceiver 24 is linked to a modem/router 26 of the central server 20 for data communication. In the illustrated example, this link is a wireless telecommunications link (e.g. a WiFi link) but alternatives include wired telecommunications links (e.g. Ethernet) and a HomePlug-type link using the power supply lines, or a combination of these.

Figure 3 shows a similar installation to that of fig. 2. It differs in that a separate remote transceiver 24a, 24b, 24c is provided for each phase 22a, 22b, 22c of the three-phase power supply 22. The modem/router 26 of the server 20

communicates data to and from all three of these transceivers 24a, 24b, 24c. The same data may be sent to all three transceivers or, if preferred, they may be individually addressable and different data signals transmitted to each.

5

As with the installation of figure 2, although a wireless link is illustrated between the transceivers 24a, 24b, 24c and the modem 26 other forms of link are possible.

CLAIMS

1. A shelving system comprising a support structure, one or more shelves mounted on the support structure, at least one networkable electronic device mounted on a shelf or the support structure and conductors for power supply and data transmission to said networkable device, wherein one or more of said conductors provide a shared line for power supply and data transmission.
2. A shelving system according to claim 1, wherein the power supply to the networkable electronic device is an extra-low voltage power supply.
3. A shelving system according to claim 1 or claim 2, further comprising a receiver electrically connected to said networkable device by said shared line, the receiver being for receiving data from an external source for onward transmission to said networkable device over said shared line.
4. A shelving system according to claim 3, wherein the data from the external source is transmitted to the receiver over power supply wiring.
5. A shelving system according to claim 4, wherein the power supply wiring is for a mains power supply.
6. A shelving system according to claim 5, wherein the power supply wiring is for a single phase of a three-phase mains power supply.

7. A shelving system according to claim 3, wherein the data from the external source is transmitted to the receiver over a wired telecommunications network.
- 5 8. A shelving system according to claim 3, wherein the data from the external source is transmitted to the receiver over a wireless telecommunications network.
9. A shelving system according to any one of the preceding
10 claims, comprising a plurality of networkable devices mounted on shelves and/or the support structure and connected to said shared line, the shared transmitting data to all of the networkable devices.
- 15 10. A shelving system according to claim 9, wherein each of said networkable devices is individually addressable, whereby data transmitted over said shared line can be addressed to individual ones of said devices.
- 20 11. A data network comprising a shelving system according to any one of the preceding claims, an external data source and means for transmitting data from the external source to a receiver associated with the shelving system for onward
25 transmission to one or more networkable devices of the shelving system over said shared line.

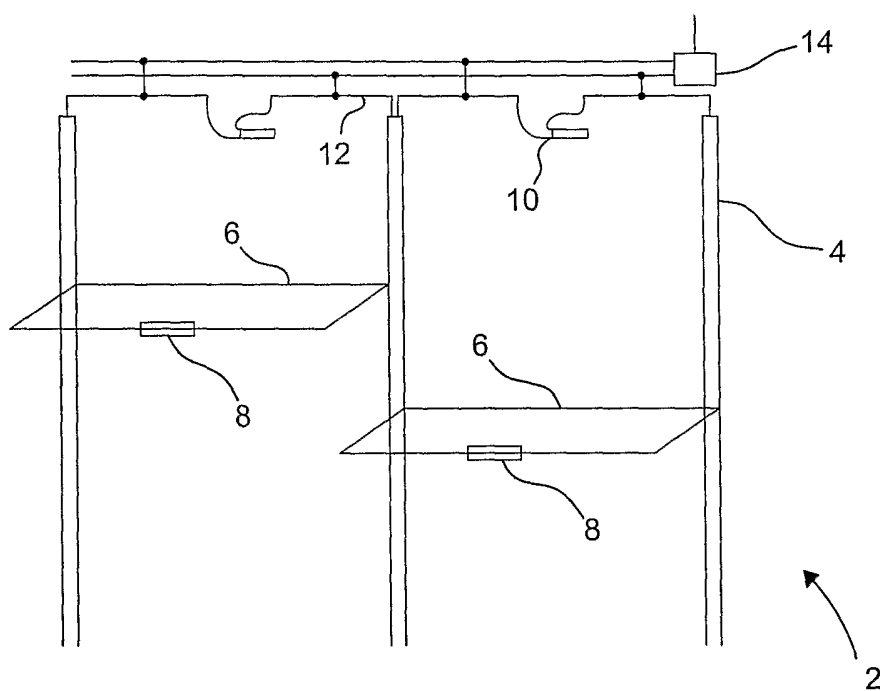


Fig. 1

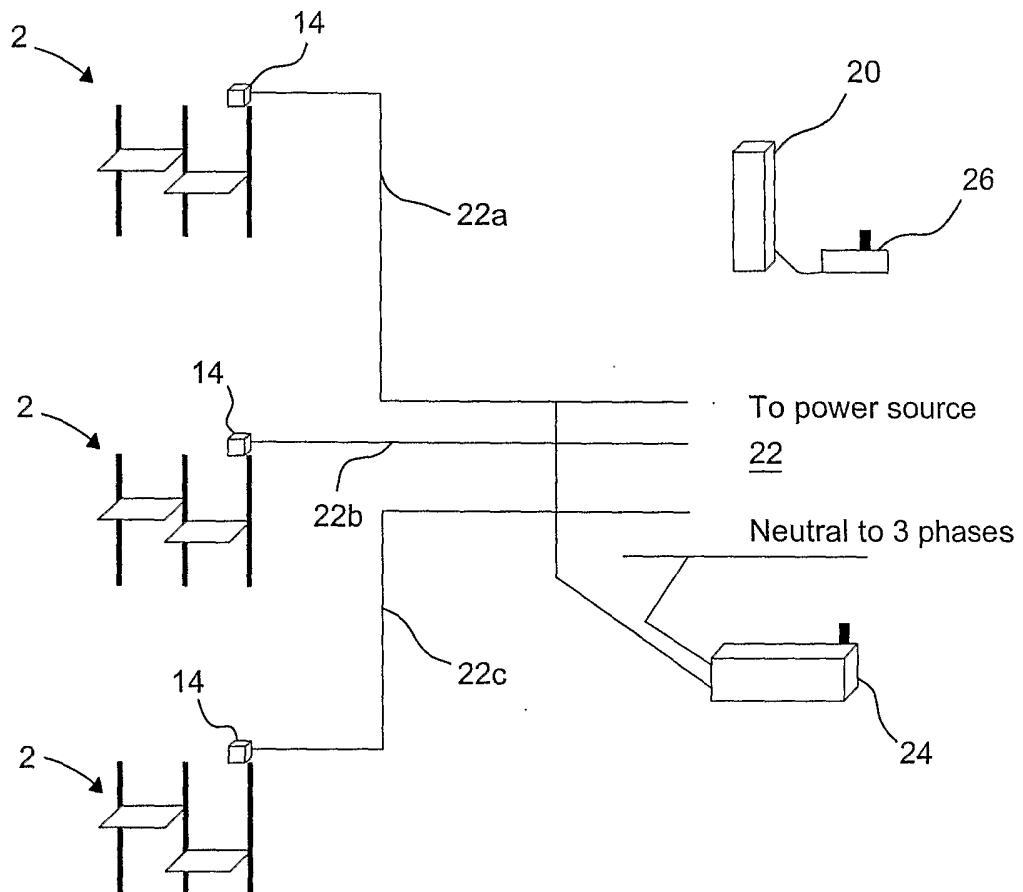


Fig. 2

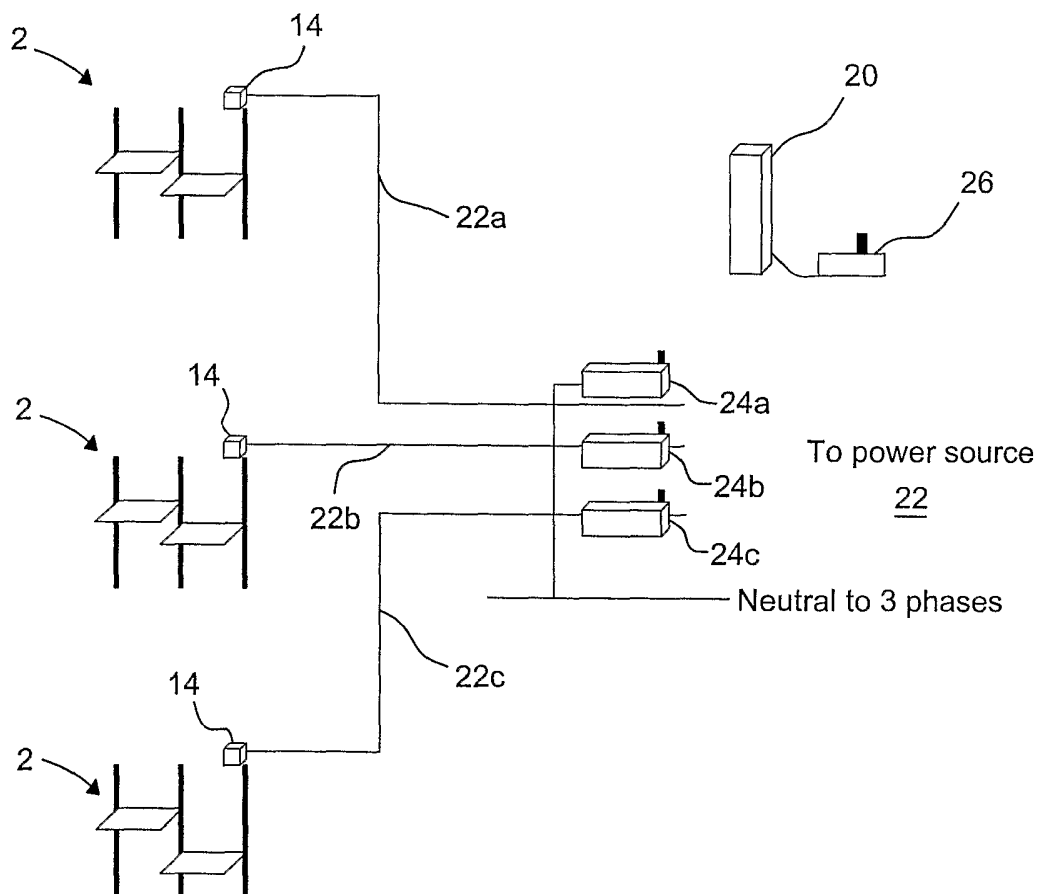


Fig. 3

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2006/003124

A. CLASSIFICATION OF SUBJECT MATTER
 INV. G09F3/20 G07G1/14 G06K17/00 G09F9/00 A47F10/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
 Minimum documentation searched (classification system followed by classification symbols)
 A47F A47B G06K G07G G09F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
 EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X	EP 0 558 305 A2 (CLARES REGISBROOK SYSTEMS [GB]) 1 September 1993 (1993-09-01) cited in the application column 4, line 12 - column 9, line 2; figures 1-9	1-11
X	US 4 002 886 A (SUNDELIN RONALD MURL) 11 January 1977 (1977-01-11) column 2, line 14 - column 5, line 50; figures 1-5	1-11
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Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family
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Date of the actual completion of the international search 2 November 2006	Date of mailing of the international search report 15/11/2006
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Klintebäck, Daniel
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INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2006/003124

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Information on patent family members

International application No

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