

DescriptionBACKGROUND OF THE INVENTIONFIELD OF THE INVENTION

[0001] The present invention is in the field of printing methods and apparatus. More particularly, the present invention relates to a printer having associated printer memory which stores information identifying and providing instructions for utilization of a consumable printer cartridge or print head. The printer memory may be interfaced with a database having identified updating and upgrading information and instructions (i.e., utilization instruction sets), which instructions are identified and utilized by reference to the stored printer cartridge or print head identifying information. The interface of the printer with the database for such updating and upgrading purposes may be effected under user command, or may be effected automatically without user command, by use of the internet. A method of operating the printer, an associated local and server computer, and a database of printer cartridge utilization instruction sets are also explained.

RELATED TECHNOLOGY

[0002] Presently, printers (such as inkjet and laser jet printers) store information about how to utilize toner cartridges, inkjet printer cartridges, ink cartridges, or printing heads, for example. This identification and utilization information allows the printer to utilize various ones, or multiple, toner or printing cartridges, for example, when such toner or printing cartridges are provided to the printer by a user. The toner cartridges, printing cartridges, ink cartridges, and print heads are consumable, and have a limited life span. Thus, these items are replaced several times during the life of a printer with new toner cartridges, printing cartridges, ink cartridges, or print heads. Usually, the user provides a new toner, printing cartridge, or print head, for example, to a printer by simply inserting or installing such a cartridge of printing head in the printer. When such a user-performed installation is completed, the printer will identify the toner, printing cartridge, ink cartridge, or the printing head of a cartridge, for example, and will access a database provided (perhaps in printer memory) instructing the printer how to use the particular installed toner or printing cartridge.

[0003] This facility for printers to identify and utilize various toner and printing cartridges, and various ink cartridges and printing heads, also allows particular printers to utilize differing toner and printing cartridges, for example. Additionally for example, a printer may utilize a black-ink, or black-toner cartridge, and may also alternatively have installed in it and automatically utilize a colored ink or colored multi-toner cartridge. Thus, the user may use the same printer to print documents using

a black-ink or black-toner cartridge, and may then render colored graphics or illustrations simply by changing the printer cartridge. A printer may further utilize a number of different black ink cartridges, and a number of different color ink cartridges. These cartridges may differ, for example, in the quantity or type of ink or printing fluid or toner they provide, or in the size or arrangement of printing nozzles, or the size and arrangement of printing "pixels" the printing cartridges or print heads provide. Thus, the user of a printer may be provided with a number of printer cartridge sizes, print head arrangements, toner or ink colors, and ink or toner type options when the user purchases new toner or ink cartridges, or print heads for a printer.

[0004] With the conventional technology, the user simply purchases a toner or printing ink cartridge, for example, that will interface with the user's printer, and the cartridge is identified to the printer upon installation, and is utilized by the printer. The result of this ability of printers to utilize multiple toner or ink cartridges, is that the users of such conventional printers may more easily select toner or ink cartridges, or print head arrangements, for example, that more fully meet the user's wishes and needs for printing on various types of print media (i.e., plastic film or paper, for example), and with various types of inks and toners.

[0005] Conventionally, the database of identification and utilization information is stored in a user's printer (or in a user's computer), and is fixed in nature. That is, the data base is part of a printer driver software or part of a computer operation data base, and is not modified when a printer cartridge is installed in the printer. It would be an advantage if printer cartridge identification and utilization information, for example, could be stored in a database accessible by a printer over the internet so that a virtually unlimited database, which is also easily updated and upgraded, were provided to a printer.

SUMMARY OF THE INVENTION

[0006] In view of the deficiencies of the conventional related technology, it is an object of this invention to overcome one or more of these deficiencies.

[0007] A further object for this invention is to provide a printer having a network interface with a database providing identification and utilization information, for example, for a print cartridge, ink cartridge, toner cartridge, or print head. The printer achieves network interface either directly or via an associated computer, and obtains needed identification and utilization information for a printer cartridge, for example, shortly after such a printer cartridge is installed by a user of the printer.

[0008] An advantage of the present invention resides in the ability of the printer to utilize the latest and most updated and upgraded information about various printer cartridges, print heads, toner cartridges, and ink cartridges. For example, in the event that utilization information for a particular printer cartridge (or combination

of a particular printer and cartridge, for example) is upgraded after a serial run of such cartridges is completed and the cartridges are in the commercial stream of marketing and distribution, then when such a particular printer cartridge is purchased by the owner of a printer, and is installed in the owner's printer, the owner's computer system will provide for interface of the printer with a utilization database having the latest and most upgraded and updated information for use of this particular printer cartridge. In this way, the user of the printer is assured of receiving the best possible performance and service from the newly-purchased printer cartridge. Further, the manufacturer of the printer cartridges is assured of the highest level of user satisfaction with both the printer and the printer cartridges. Further, the user of the printer and cartridges, and the manufacturer of the printer cartridges are in communication with one another via the printer (and possibly via the user's computer), so that utilization and identification information particular to the user's printer and printer cartridges can be compiled for the user's benefit.

[0009] That is, identification and utilization information best suited to the way a particular user utilizes a printer may be provided automatically from the database without the user having to seek, identify, select, and download such information.

[0010] Other objects, features, and advantages of the present invention will be apparent to those skilled in the art from a consideration of the following detailed description of a preferred exemplary embodiment thereof taken in conjunction with the associated figures which will first be described briefly.

BRIEF DESCRIPTION OF THE DRAWING FIGURES

[0011] Figure 1 is highly diagrammatic depiction of a user's computer and printer, which are interfaced with a server computer and database via the internet. The internet also provides interfaces and possible connections for a variety of other computer systems and devices;

[0012] Figure 2 provides a more particularized representation of the user's computer and printer, interfacing via the internet with the server computer and with a database associated with the server computer; and

[0013] Figure 3 provides an illustration of a printer as seen in Figures 1 and 2, and embodying the present invention.

DETAILED DESCRIPTION OF AN EXEMPLARY PREFERRED EMBODIMENT OF THE INVENTION

[0014] While the present invention may be embodied in many different forms, a specific exemplary embodiment is disclosed that illustrates and explains the principles of the invention. In conjunction with the description of this embodiment, a method of operating or utilizing the embodiment is described. The preferred embod-

iment depicted, described, and explained herein has to do with a printer utilizing a printer cartridge. However, it is to be understood that the printer cartridge is representative of consumable, replaceable, or renewable items of various printers that may embody this invention. For example, the consumable item may include a printer cartridge, a toner cartridge, a print head, or an ink cartridge, dependent upon the type of the printer. Other consumable items of a printer embodying the present invention, which items are replaced, or renewed, for example, during the life and use of the printer may also cause the printer to access an updating database over the internet in accord with this invention. Thus, it should be emphasized that the present invention is not limited to the specific embodiment illustrated.

[0015] Referring first to Figure 1, a conceptual digital communication network (i.e., internet) 10 embodying the present invention is depicted. The network 10 comprises an exemplary generalized portion 12, which is generally depicted as a cloud-like structure, and which optionally interconnects users both locally as well as across a wide area (i.e., nationally and internationally). The communication network 12 may effect this interconnection using a combination of various types of communication channels and links, such as public service telephone systems with local telephone twisted-pair wires, long-lines cables, fiber optic communication links, radio communication links, microwave communication links, cellular telephone systems, CATV cables, RGU cable, Direct TV links, and satellite links. It will be understood as well that other present and future types of communication channels and links may be included in the network 12. That is, all present and future types and varieties of internet communication hardware and software is possible of utilization by the present invention.

[0016] The network 12 includes two exemplary sub-networks, each indicated with the numeral 12 with a single (') or double (")prime added. Each of the exemplary sub-networks 12' and 12" is more localized. These sub-networks 12' and 12" may be at any arbitrary distance from one another. For example, the sub-networks 12' and 12" may be in adjacent buildings, in adjacent towns, or may be separated from one another by a great distance. The network 12 may include a great number of other sub-networks, as is suggested by partial details depicted in dashed lines in Figure 1. Each such sub-network may include a variety of information sources and information receivers. For example, the sub-networks may include a local area network (LAN), indicated with the numeral 14. Another LAN 14' may communicate with LAN 14 via the network 12. The network 12 may also include other data sources and receivers, such as private branch exchanges (PBX) 16 (i.e., telephone), main-frame or lower-scale computers 18, and computer work stations 20, for example). All of these facilities, and others, may communicate with one another via the network 12.

[0017] Although not illustrated in detail in Figure 1, the

network 12 comprises a number of multi-protocol routers 22 (i.e., ATM interconnection devices) which are capable of interconnecting network nodes using a variety of conventional WAN protocols. ATM is a universal protocol which can be used for both WANs and LANs, as well as for other digital communication interconnections.

[0018] Particularly in view of the above, it is seen that the sub-network 12' having a PC 24 and printer 26 is capable of bi-directional communication via the network 12 with the sub-network 12" having a server computer 28 and database 30.

[0019] Turning now more particularly to a consideration of Figure 2, it is seen that the network 12 is depicted as a virtual connection between the PC 24 and the server computer 28. This virtual connection is called into existence, for example, by either the PC 24 or server computer 28 (i.e., either automatically in response to software commands, for example, or in response to a user command). While this virtual connection 12 exists, the PC 24 and server computer 28 are in two-way communication with one another to pass requests, data, information, and software between them. During such a virtual connection, information concerning the identification of the printer 26, and of the printer or toner cartridge (identified below) which is installed in this printer, may be provided to the server computer 28. In response, the server computer 28 may determine that for a particular combination of printer 26 and printer cartridge, an updated or upgraded utilization program or data set exists. In such an event, the server computer 28 will access this utilization program or data set, and provide it to the PC via the network connection 12.

[0020] Alternatively, the user of the PC may desire to use a particular printer and printer cartridge combination to perform a particular type or style of printer. In such a case, the user of the PC may search the database 30 via the server computer 28 and internet connection 12 in order to determine if software or a utilization data set exists to facilitate this particular use of the printer 26 and its installed printer cartridge. If such a utilization software or data set is available, the user simple commands its downloading into the PC 24 and printer 26 via the network connection 12.

[0021] Considering now Figure 3, it is seen that the printer 26 includes a printer I/O (input/output) circuit 32, by which commands and data are received from the PC 24, and by which communications from the printer to the PC 24 may be effected. The I/O circuit connects with a microprocessor 34 of the printer 26 for bi-directional communication. It is important to note that the microprocessor 34 is not the "brain" of the PC 24, but is dedicated to the printer 26 and provides a facility for processing and directing the operations of the printer 26 itself. Thus, the printer 26 will be understood to be a "smart" device, and to have the ability to store and utilize programming of its own. Thus, in Figures 2 and 3 it is seen that the printer 26 may include a modem circuit section 26A, and may effect an internet connection (i.e.,

indicated by the dashed line connection to internet 12) exclusive of local PC computer 24. Those ordinarily skilled in the pertinent arts will understand that modem circuit section 26A is representative only, and that the internet connection effected for printer 26 may be effected by a variety of different devices. For example, a DSL line and modem, or a cable modem and local cable modem service (i.e., over coaxial RGU cable) may be utilized to provide an internet connection for the printer 26 (or for computer 24).

[0022] Further, the microprocessor 34 has a bi-directional connection with a memory facility 36, which may include, without limitation, a section 36A of ROM (read only memory), for example, and a section 36B of EPROM type (erasable, programmable read-only memory) or RAM type (random access memory) type of memory. The memory facility 36 may also include a hard-drive (i.e., disk drive) type of memory. The ROM memory may be utilized, for example, to store and provide basic instructions for the operation of printer 26. These instructions are provided at the time the printer is manufactured, and are not changeable during its useful life. On the other hand, it should be recognized that particular instructions stored in ROM memory may be superseded by other instructions stored in memory section 36B. Thus, operating characteristics for the printer 26 may be upgraded or updated during the life of the printer 26.

[0023] Similarly, the EPROM or RAM type of memory (i.e., memory section 36B) may be utilized to store and provide instructions for the operation of the printer 26, including the operation of a printer cartridge (identified below) installed in the printer 26. As was pointed out above, the EPROM or RAM section of memory may also be used to store information and instructions that supercedes some or all of the operating instructions for the printer which are stored in memory section 36A. Other parts of the memory 36 may be utilized as a print buffer, for example, to temporarily store printing data and information for the printer during the performance of a printing job, as will be understood to those ordinarily skilled in the pertinent arts.

[0024] The microprocessor 34 also has a bi-directional communication interface with a mechanism portion 38 of the printer 26. The mechanism portion 38 of the printer 26 may include, for example, such devices as a paper feed mechanism, a paper advancement mechanism, a carriage 40 for a printer cartridge 42, a power supply for the printer cartridge, a switching and control network of the printer for controlling the application of printing signals to a printing cartridge, and other physical facilities of the printer 26 (with the exception of carriage 40 and cartridge 42, all these mechanical facilities of the printer 26 are indicated diagrammatically in Figure 3 with labeled box 38A). By way of illustration and example, the carriage 40 for a printer cartridge 42 will have bi-directional communication interface with the microprocessor 34. Thus, it is seen from Figure 3, that a print-

er cartridge 42 when installed in the carriage 40 of the printer 26 also has bi-directional communication with the microprocessor 34, and with the memory facility 36. Thus, the identification of the printer cartridge is available to memory 36 and to microprocessor 34. This information may be passed from the printer 26 to PC 24. Alternatively, it is to be understood that in preparation for installing a printer cartridge in printer 26, the user may input into computer 24 the identification information for this printer cartridge. This information inputting operation may be performed, for example, by the user from the keyboard of the computer, or may be performed by such expedients as utilizing a bar code tag on the printer cartridge 42, along with a bar code reader interfaced with computer 24.

[0025] In view of the above, it is to be appreciated that when a user of the printer 26 installs a printer cartridge 42 into the printer 26, this cartridge is identified to the printer, and may also provide identification and utilization information to the memory 36 of the printer. One way in which this identification and utilization information for the particular printer cartridge may be provided commensurate with installation of a particular printer cartridge is by provision of a ROM memory chip 42A within the cartridge 42 itself. Alternatively, the cartridge 42 may be identified to the printer 26 by features or a combination of features of its physical or electrical interconnection with the printer 26.

[0026] Also, and further in view of the above, it will be appreciated that once the cartridge 42 is identified to the printer 26, this identification information (as well as possibly utilization information from memory chip 42A) is available to server computer 28 during a session of internet connection, as was depicted in Figures 1 and 2. One way in which such a session of internet connection may be initiated is to provide either the printer 26 or PC 24 with an instruction set providing for an automatic interconnection with the server 28 as soon as is possible following the installation of a new printer cartridge 42 in the printer 26.

[0027] Alternatively, the instruction set of the printer 26 or PC 24 may prompt a user to initiate such an internet connection following the installation of a new printer cartridge 42. Still alternatively, the server computer may periodically "poll" printers known to be interfaced with the network 12, and may then determine which ones have had a new printer cartridge installed since the last polling. In each of these cases, once a communication session of the printer 26 with the database 30 is established (recalling Figures 1 and 2 above), the identification of the printer cartridge 42 and the utilization data set stored in printer 26 or in PC 24 for this printer cartridge is compared. In the event that an upgraded or updated instruction or utilization software is available for the particular printer cartridge, then this is downloaded in to PC 24 or into printer 26. The user of the PC 24 and printer 26 may be prompted for permission to use this newly downloaded software.

[0028] An advantage of this present invention resides in the ability of the operator of the database 30 to provide for each individual one or group of printer cartridges to be operated with a particular instruction and utilization software. The utilization and instruction software may be updated and upgraded at any time, even after a group of printer cartridges are in the hands of users for these printer cartridges. Thus, in the event that a software upgrade or update particular to as few as even one printer cartridge is identified and placed into the database, the user of that cartridge (or of any number of cartridges of a group) may obtain the latest and best software for the operation of that cartridge via the internet. An improved level of customer support and of customer satisfaction with the results of printer use is possible by use of this invention.

[0029] Those ordinarily skilled in the pertinent arts will further appreciate that the present invention may be embodied in other specific forms without departing from the spirit or central attributes thereof. Because the foregoing description of the present invention discloses only a particularly preferred exemplary embodiment of the invention, it is to be understood that other variations are recognized as being within the scope of the present invention. Accordingly, the present invention is not limited to the particular embodiment which has been described in detail herein. Rather, reference should be made to the appended claims to define the scope and content of the present invention.

Claims

1. A printer device (26), said printer device (26) comprising:

a printer mechanism (38) for moving printing medium through the printer device (26), and an element (42) selected from the group consisting of: a printer cartridge, a toner cartridge, a print head, and an ink cartridge, said printer device utilizing the selected element (42) in applying printing indicia to the printing medium;
a memory device (36) for receiving and storing a particular utilization instruction set for said selected element (42); and
an internet interface facility (24, 26) for effecting internet connection of said memory device (36) with a database (30) of utilization instruction sets, and for downloading said particular utilization instruction set into said memory device (36).

2. A printer device (26), said printer device (26) comprising:

a printer mechanism (38) for moving printing medium through the printer device, and printer

cartridge means (42) for applying printing indicia to the printing medium;
 a memory device (36) for receiving and storing a particular utilization instruction set for said printer cartridge means (42); and
 an internet interface facility (10) for effecting internet connection of said memory device (36) with a database (30) of utilization instruction sets, and for downloading said particular utilization instruction set into said memory device (36).

3. The printer device (26) of Claim 1 or 2, wherein said internet interface facility (10) includes a local computer (24).

4. The printer device (26) of Claim 1 or 2, wherein said internet interface facility (10) includes said printer (26) having a processor (34), and an internet communication device (26a).

5. The printer device (26) of Claim 1 or 2, wherein said memory facility (36) resides within said printer (26).

6. An internet system (10) for storing and downloading into individual printers (26) particular utilization instruction sets for consumable items (42) selected from the group consisting of: printer cartridges, print heads, ink cartridges, and toner cartridges, said internet system (10) comprising:

a printer (26) for receiving and utilizing a selected consumable item (42), the printer (26) including means (36) for receiving identification information for the selected consumable item (42);
 a server computer (28) having an associated database (30) of utilization instruction sets for particular consumable items (42); and
 a communication net (10) interfacing said printer (26) with said server computer (28) and database (30) to download to said printer (26) a utilization instruction set for a particular identified consumable item (42).

7. An internet system (10) for storing and downloading into individual printers (26) particular printer cartridge utilization instruction sets, said internet system comprising:

a printer (26) for receiving and utilizing a printer cartridge (42), the printer (26) including means (36) for receiving identification information for the printer cartridge (42);
 a server computer (28) having an associated database (30) of utilization information for particular printer cartridges (42); and
 a communication net (10) interfacing said print-

er (26) with said server computer (28) and database (30) to download to said printer (26) a utilization data set for a particular identified printer cartridge (42).

8. A method of operating a printer (26) utilizing a consumable item (42), said method comprising steps of:

identifying a particular consumable item (42) installed in the printer (26);
 interfacing the printer (26) via the internet (10) with a database (30) of plural utilization instruction sets for such consumable items (42), determining if the particular installed consumable item (42) has an utilization instruction set stored in the database (30), and downloading via the internet (10) the utilization instruction set for the particular installed consumable item (42).

9. The method of Claim 8, further including the step of providing for said printer (26) to utilize a particular consumable item (42) selected from the group consisting of: a printer cartridge, a toner cartridge, a print head, and an ink cartridge.

10. A method of operating a printer (26) utilizing a consumable printer cartridge (42), said method comprising steps of:

identifying a printer cartridge (42) installed in the printer;
 interfacing the printer (36) via the internet (10) with a database (30) of plural utilization instruction sets for printer cartridges (42), determining if the installed printer cartridge (42) has a utilization instruction set stored in the database (30), and downloading via the internet (10) the utilization instruction set for the installed printer cartridge (42).

11. The method of Claim 8 or 10, further including the steps of providing for said printer (26) to be interfaced with a local computer (24), and utilizing said local computer (24) to effect said interfacing of the printer (26) via the internet (10) with said database (30).

12. The method of Claim 8 or 10, further including the step of including a modem (26a) in said printer (26), and providing for said printer (26) to make direct internet access.

13. The method of Claim 8 or 10, further including the step of providing an internet server computer (28), and a database (30) of utilization instruction sets associated with said internet server computer (28).

FIG. 1.

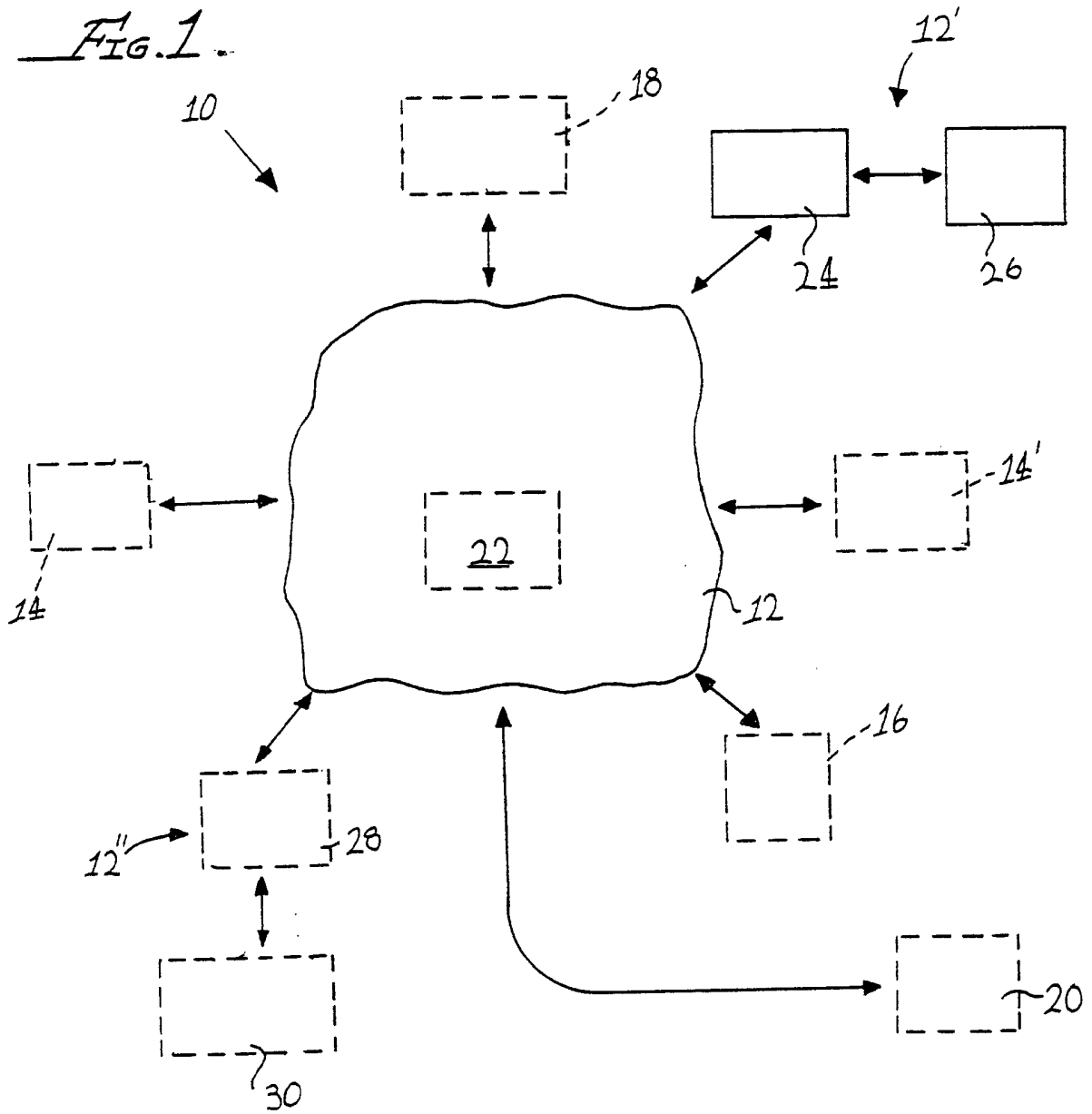


FIG. 2.

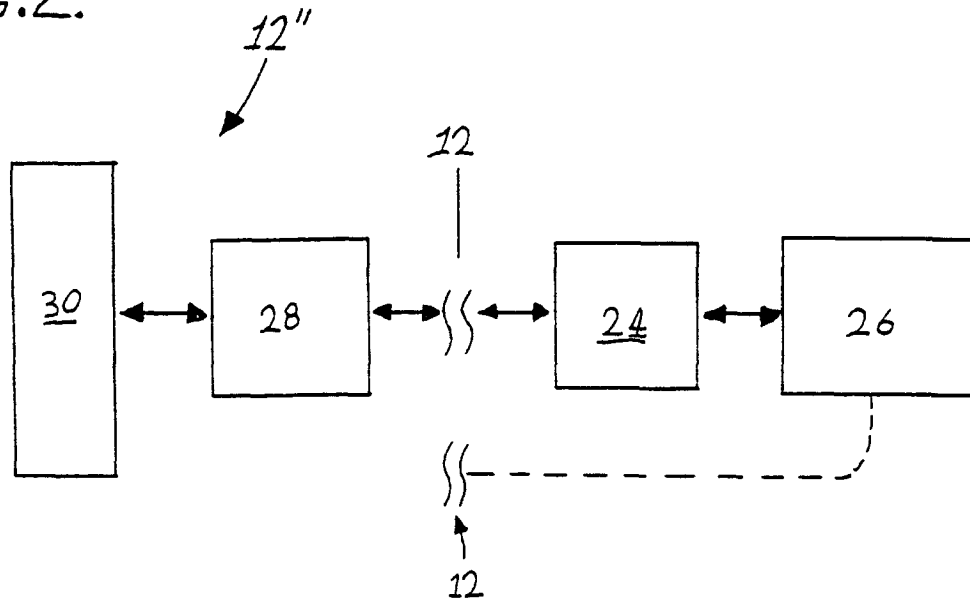
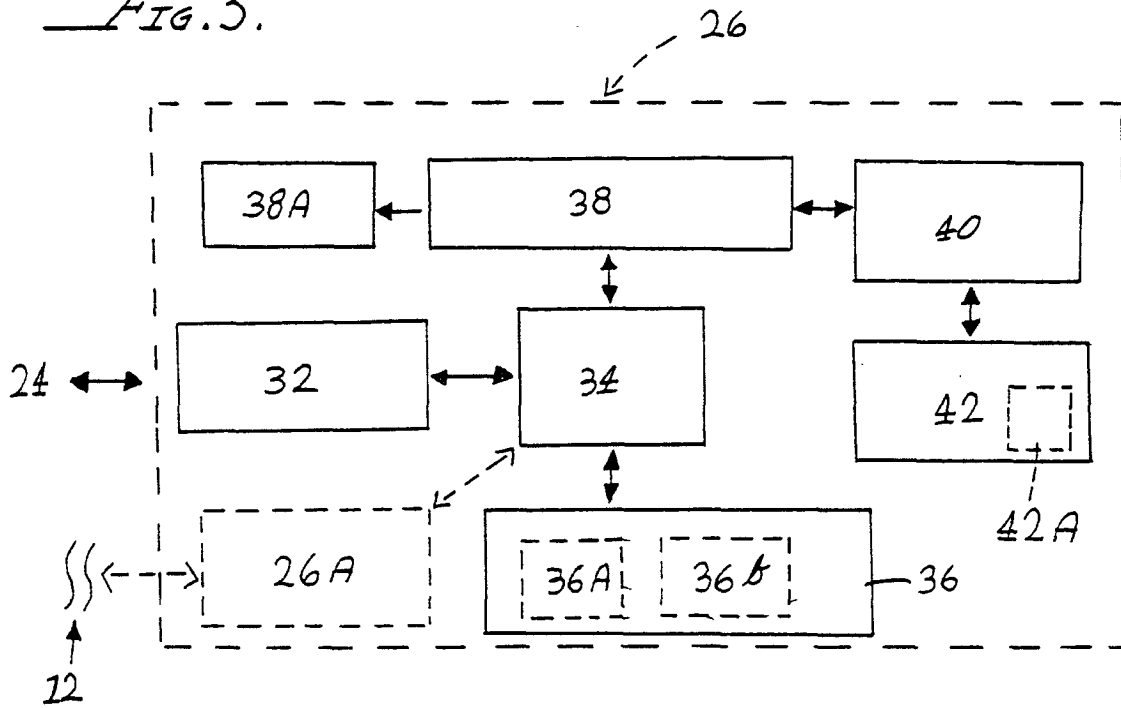


FIG. 3.





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 30 6917

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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The present search report has been drawn up for all claims			
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CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 01 30 6917

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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