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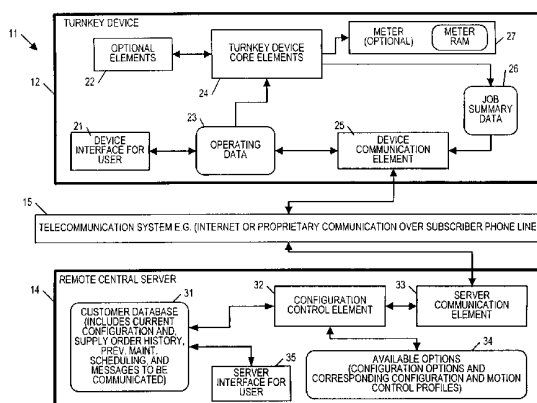
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(54) Title: DYNAMICALLY RECONFIGURABLE TURNKEY SYSTEM



(57) **Abstract:** A dynamically reconfigurable turnkey system (11), such as a mailing machine or a photocopier, including a turnkey device (12), responsive to commands from a user for performing a task according to instructions stored in the turnkey device, for providing a request to alter the device capabilities and performance in response to instructions provided by the user, and further responsive to reconfiguration data for altering the device capabilities and performance; and also including a remote central server (14), for providing the reconfiguration data in response to the request to alter the capabilities and performance of the turnkey device. The turnkey device includes all of the hardware needed to perform any of the functions the turnkey device is designed to be capable of performing, but includes only software for a selected set of functions. The user of the turnkey device downloads from the remote central server (14) the software for different sets of functions as needed. In some applications, the turnkey device (12) also provides job summary data (26), and the remote central server (14) receives the job summary data (26) and makes the job summary data (26) available to the user of the remote central server (14) so as to enable data mining of the job summary data (26) by the user of the remote central server (14). The remote central server then provides to the turnkey device (12) suggested alterations in the configuration of the turnkey device (12) indicated by the user based on the data mining by the user.

DYNAMICALLY RECONFIGURABLE TURNKEY SYSTEM**FIELD OF THE INVENTION**

The present invention pertains to the control of turnkey devices for printing on media or for copying printed material, and more particularly to the remote control of
5 the capabilities, features, and modes of execution of such devices.

BACKGROUND OF INVENTION

Typically, according to the prior art, when a printing or copying turnkey device, such as a mailing machine (including a postage meter) for printing postage on a mailpiece, is purchased by a customer, the customer (or the marketing group selling
10 the turnkey device) has had to predict what capabilities, features, and modes of execution should be provided by the device. Then the device is provided in the corresponding configuration, i.e. it is provided with corresponding hardware (including electronics) and software, including both configuration and other data as well as software that controls the device according to the configuration and other
15 data. Besides configuration data for a device, the device data could include, for example, a motion profile for regulating how the device executes a machine cycle. If a customer (or marketing) incorrectly assesses the customer's needs, or if these needs change, the hardware and software must be modified or replaced.

For example, if a customer is going to purchase a mailing machine, the
20 customer must decide whether the mailing machine is to include a scale to automatically weigh a mailpiece and determine the proper postage. In addition, the customer will guess the processing speed (in mailpieces per minute) that is needed to satisfy the customer's needs. A mailing machine is then provided with the hardware and software corresponding to the requirements anticipated by the
25 customer. Such a mailing machine is a turnkey system in that there is essentially no adjustment to be made; it works only one way. If the features and capabilities must be changed to more closely meet the customer's needs, then new modules (hardware and software) must be provided to the customer in replacement of, or in addition to, existing modules.

What is needed is a system for enabling a customer to remotely adjust or alter (turn on or off) the features and capabilities of a turnkey device, such as a mailing machine, without having to add corresponding modules or replace existing modules, and without transforming the turnkey device into a more complex (harder
5 to use) device. Being able to remotely change or alter the features of a turnkey device would give great flexibility to the operator of the turnkey device.

SUMMARY OF THE INVENTION

Accordingly, the present invention provides a dynamically reconfigurable turnkey system, including a turnkey device, responsive to commands from a user for
10 performing a task according to instructions stored in the turnkey device, for providing a request to alter the device capabilities and performance in response to instructions provided by the user, and further responsive to reconfiguration data for altering the device capabilities and performance; and also including a remote central server for providing the reconfiguration data in response to the request to alter the capabilities
15 and performance of the turnkey device.

In a further aspect of the invention, the turnkey device also provides job summary data, and the remote central server receives the job summary data and makes the job summary data available to the user of the remote central server to enable data mining by the user of the job summary data. The remote central server
20 then provides to the turnkey device suggested alterations in the configuration of the turnkey device indicated by the user based on the data mining by the user.

In other, further aspects of the invention, the turnkey system is a photocopier or the turnkey device is a mailing equipment device such as a mailing machine.

In still another, further aspect of the invention, the turnkey system also
25 includes turnkey device core elements, for providing core features, performance, and activating optional features and performance in response to configuration data; optional elements for providing optional features and performance in response to commands by the turnkey device core elements activating the optional features and performance; configuration data element for providing a current configuration
30 indicating specific optional features and performance, responsive to the reconfiguration data provided by the remote central server; and a device communication element for providing the request to alter the capabilities and

performance of the turnkey device in response to instructions provided by the user, and for receiving the reconfiguration data provided by the remote central server. In a further aspect of the invention, the turnkey device is a meter having embedded memory, and in some embodiments of this aspect of the invention, the turnkey
5 device is a mailing machine, and the meter is a postage meter.

In yet even another, further aspect of the invention, the remote central server includes a server communication element for communicating with the turnkey device and a configuration control element for providing the reconfiguration data to the turnkey device in response to an indication to provide new configuration data for the
10 turnkey device and an indication of what new configuration data to provide.

Thus, the present invention provides a turnkey system with the entire hardware needed for any feature (function) of the turnkey system but with software only for a selected set of features (functions). Included in the hardware is an amount of non-volatile RAM adequate to store the software needed for a typical set
15 of features, but not for holding simultaneously the software for all possible features. If a customer would like to alter the set of features, then the software for the different features may be downloaded and stored in replacement for some or all of the software for the existing features. Thus, the same non-volatile RAM is used for a wide range of different applications, and the operator of the turnkey system is able to
20 change or alter the functionality of the turnkey system (e.g., by downloading software for new functions as needed) so that the turnkey system may be configured for different applications.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other features and advantages of the invention will become
25 apparent from a consideration of the subsequent detailed description presented in connection with accompanying drawings in which:

Fig. 1 is a block diagram of a system including a turnkey device (e.g., a mailing machine with a postage meter) and a remote central server that reconfigures the turnkey device either in response to requests from a user of the turnkey device,
30 or autonomously, based on goals for cost and performance of the turnkey system; and

Fig. 2 is a block diagram of a turnkey device according to the present invention indicating the components of the turnkey device as being either core or optional hardware, either core or optional software (not necessarily all of the software required to execute all functions the device hardware is capable of performing), or an optional meter (e.g., a postage meter in case the turnkey device is a mailing machine) with its own (nonvolatile) memory.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Referring now to Fig. 1, a turnkey device 12 according to the present invention is shown in telecommunication with a remote central server 14. The turnkey device could be, for example, a mailing machine, but is, in general, a document processing machine, and so could also be a photocopier machine or a document sorting machine.

Turnkey device 12 includes core elements 24, which are either hardware or software, and optional elements 22, which are also either hardware or software. Turnkey device 12 includes all of the hardware core elements and all of the hardware optional elements that would ever be used by device 12. In addition, device 12 includes all software core elements needed by the turnkey device. However, in the preferred embodiment, optional software elements are downloaded from the remote central server 14 as needed, at the discretion of a user of the turnkey device, usually depending on the job to be performed by the turnkey device.

For example, device 12 may be a mailing machine and its next job may be to measure the values of parameters that determine what postage is to be applied to mailpieces and to affix the appropriate postage on each of the mailpieces. In case of a large number of mailpieces, it makes sense to have device 12 (a mailing machine in this particular case) process the mailpieces at a higher rate of speed than would perhaps be used in the case of a smaller number of mailpieces. The motivation for adjusting the speed depending on the number of mailpieces is that a higher speed causes greater wear of device 12. Other kinds of characteristics of a job also argue in favor of a higher or lower speed of processing, such as, for example, whether device 12 is being used to process a series of different-sized documents (such as mailpieces), or documents of all the same size, or documents of a non-standard thickness.

If the features resident in device 12 are not suitable for the next job to be performed by device 12, then a user may download the software that would execute the needed features. To do so, the user would indicate, via a device user interface 21, a new configuration required for the turnkey device, and the new configuration
5 would then be stored in a configuration and motion profile data store 23. A device communication element 25 would then send a message over a telecommunications system 15 to the remote central server 14 based on the indicated reconfiguration in the configuration motion profile data store 23. The telecommunications system may be, for example, the Internet or a proprietary communication system using a
10 subscriber phone line.

The request to download software to reconfigure device 12 for different functionality is received by remote central server 14 via server communication element 33, which provides the request to a configuration control element 32. When configuration control element 32 receives such a request, it examines a customer
15 database 31 that includes the current configuration of device 12 (as well as the supply order history for the turnkey device and its preventive maintenance scheduling) so as to determine whether the request for the different functionality is compatible with the current configuration of device 12.

If configuration control element 32 determines that the request for different
20 functionality is compatible with the current configuration, element 32 will extract from an available options data store 34 the software corresponding to the request of functionality and provide the software to device 12 via telecommunication system 15 using server communication element 33 to interface with the telecommunication system. Data store 34 includes the actual instructions and associated operations
25 data (including e.g. postage rates and motion control profiles) for enabling any of the functions of the hardware or software components of device 12.

In another mode of operation, device 12 stores in job summary data memory 26 a summary of recent jobs performed by device 12. The summary data of recent jobs includes not simply the number of documents (such as mailpieces) processed
30 and the document characteristics (size and weight or thickness of the documents) but also, optionally, more specific information about the job, such as, for example, if the job is a mailing to individuals according to a specific set of criteria. Device communication element 25 in this mode of operation examines the job summary

data 26 and periodically transfers to the remote central server 14 via the telecommunication system 15 any new job summary data. Remote central server 14 then makes the job summary data available for inspection by a user via a server user interface 35. The job summary data should be detailed enough to allow a user
5 to inspect the job summary data and then make suggestions for better meeting the needs of customers. An inspection of job summary data that is sufficiently detailed for that purpose is called here *data mining*.

The job summary data is stored in the customer database 31, and the user of remote central server 14 may indicate messages to be communicated to device 12
10 as a result of the data mining of the job summary data. Such messages might, for example, suggest to the operator of device 12 that device 12 is not being used optimally because, for example, small jobs are being processed at an unnecessarily high processing speed, or that device 12 is likely to run out of one or another consumable (for example ink or envelopes), or that the user of device 12 might
15 benefit from considering an upgrade to a more advanced device 12 capable of routinely handling processing at higher processing speeds that may be selected by the user. Such messages are received by the device communication element 25 of device 12 and stored in the configuration and motion profile data store 23. The device user interface 21 is organized to periodically examine the configuration and
20 motion profile data store 23 and to indicate on a display provided as part of the device user interface 21 the messages sent from remote central server 14.

The configuration and motion profile data store 23 includes an indication of the current configuration of device 12, the software for executing the software of the optional functions, as well as operating data, including for example, in the case of a
25 mailing machine, postal rates based on either weight or based on other metric parameters such as a combination of weight and size, as well as any motion profile data used by the optional functions. The term *motion profile data* is used here to indicate data that coordinates the motion of different machines of device 12 to accomplish different processing operations performed by device 12.

Referring now to Fig. 2, device 12 is shown in terms of its hardware and
30 software elements. In this drawing, device 12 includes core hardware elements 41 with one element being core random access memory (RAM) 41'. Device 12 also includes core software elements 42 (stored in core RAM 41'). In addition, device 12

includes optional hardware elements 45 and some or all of the corresponding software, the corresponding software also being stored in core RAM 41'. Device 12 is provided with all core hardware elements 41, with all core software elements 42, and with all optional hardware elements 45, but with only those optional software
5 elements 46 ordered by a user when first procuring device 12. Optional software 46 for performing different optional functions than the optional software that is originally ordered may be downloaded by the user from the remote central server 14, as described above. The different optional software 46 is loaded in the same core RAM as the core software elements 42. Device 12 typically does not include
10 sufficient core RAM 41' to host *all* possible optional software as well as all core software. Thus, in case of a user requesting a new configuration of device 12, it is possible that some of the existing optional software will be overwritten by the optional software indicated by the requested reconfiguration.

Still referring to Fig. 2, device 12 also optionally includes meter hardware 43,
15 which in turn includes a meter having its own (non-volatile) RAM 43', separate from core RAM 41'. In addition, device 12 includes meter software 44 stored in the meter RAM 43'. In an embodiment where device 12 is a mailing machine, the meter hardware and software would be that for a postage meter.

It is to be understood that the above described arrangements are only
20 illustrative of the application of the principles of the present invention. Numerous modifications and alternative arrangements may be devised by those skilled in the art without departing from the spirit and scope of the present invention, and the appended claims are intended to cover such modifications and arrangements.

What is claimed is:

1. A dynamically reconfigurable turnkey system, comprising:
 - a) a turnkey device, responsive to commands from a user for performing a task according to instructions stored in the turnkey device, for providing a request to alter the device capabilities and performance in response to instructions provided by the user, and further responsive to reconfiguration data for altering the device capabilities and performance; and
 - b) a remote central server, for providing the reconfiguration data in response to the request to alter the capabilities and performance of the turnkey device.
2. The system of claim 1, wherein the turnkey device further provides job summary data, and wherein the remote central server receives the job summary data and makes the job summary data available to the user of the remote central server so as to enable data mining of the job summary data by the user, and further wherein the remote central server provides to the turnkey device suggested alterations in the configuration of the turnkey device indicated by the user based on the data mining by the user.
3. The system of claim 1, wherein the turnkey system is a photocopier.
4. The system of claim 1, wherein the turnkey system is a mailing equipment device.
5. The system of claim 4, wherein the mailing equipment device is a mailing machine.
6. The system of claim 1, wherein the turnkey system further comprises:
 - a) turnkey device core elements, for providing core features and performance, and further for activating optional features and performance in response to configuration data;

b) optional elements, for providing optional features and performance in response to commands by the turnkey device core elements activating the optional features and performance;

c) configuration data element, for providing a current configuration indicating specific optional features and performance, responsive to the reconfiguration data provided by the remote central server; and

d) a device communication element, for providing the request to alter the capabilities and performance of the turnkey device in response to instructions provided by the user, and for receiving the reconfiguration data provided by the remote central server.

7. The system as in claim 6, wherein the turnkey device further comprises a meter having embedded memory.

8. The system as in claim 7, wherein the turnkey device is a mailing machine and the meter is a postage meter.

9. The system as in claim 6, wherein the turnkey device further comprises a job summary data element, for receiving the job summary data and for storing the job summary data until it is communicated to the remote central server, and further wherein the turnkey device core elements further provides the job summary data, and still further wherein the device communication element periodically communicates the job summary data to the remote central server.

10. The system as in claim 1, wherein the remote central server comprises:

a) a server communication element, for communicating with the turnkey device; and

b) a configuration control element, for providing the reconfiguration data to the turnkey device in response to an indication to provide new configuration data for the turnkey device and an indication of what new configuration data to provide.

11. The system as in claim 10, wherein the remote central server further comprises: a server interface to the user, for enabling the user of the remote central server to mine the job summary data and to indicate in the customer database a message that is to be communicated to the user of the turnkey device.

12. The system as in claim 11, wherein the message is indicative of preventive maintenance that should be performed for the turnkey device.

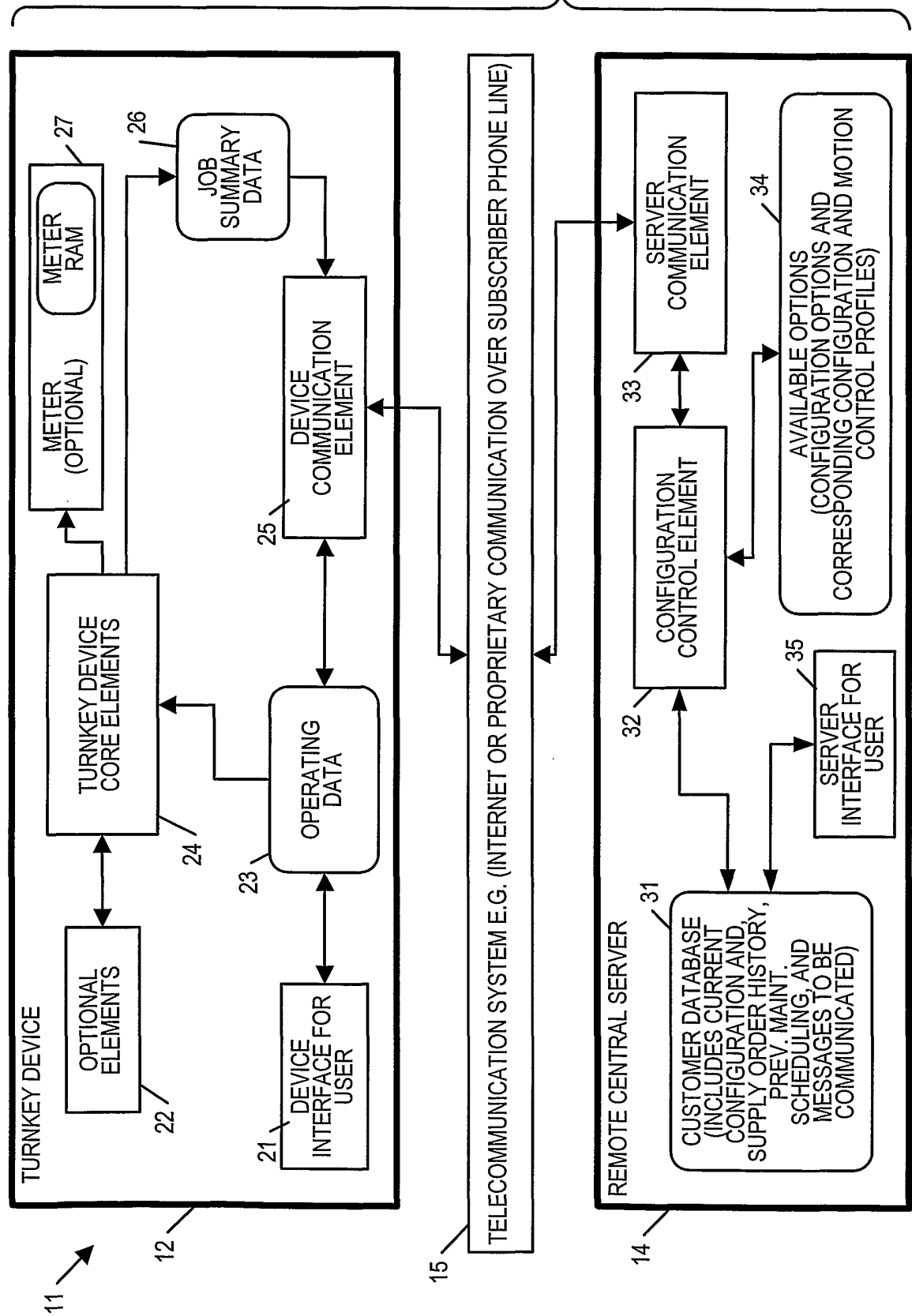
13. The system as in claim 11, wherein the message is indicative of supplies that possibly need to be replenished.

14. The system as in claim 1, wherein the reconfiguration data alters the processing speed of the turnkey device so as to accommodate different jobs.

15. The system as in claim 1, wherein the turnkey device is a mailing machine and further wherein the reconfiguration data alters the metric parameters used by the mailing machine to determine proper postage for a mailpiece.

16. The system as in claim 1, wherein the core RAM is sized so as to accommodate core software functions and only a first subset of optional software functions, and wherein when a second subset of optional software functions is downloaded, the second subset of optional software functions is stored in the core RAM in place of the first subset of optional software functions.

FIG. 1



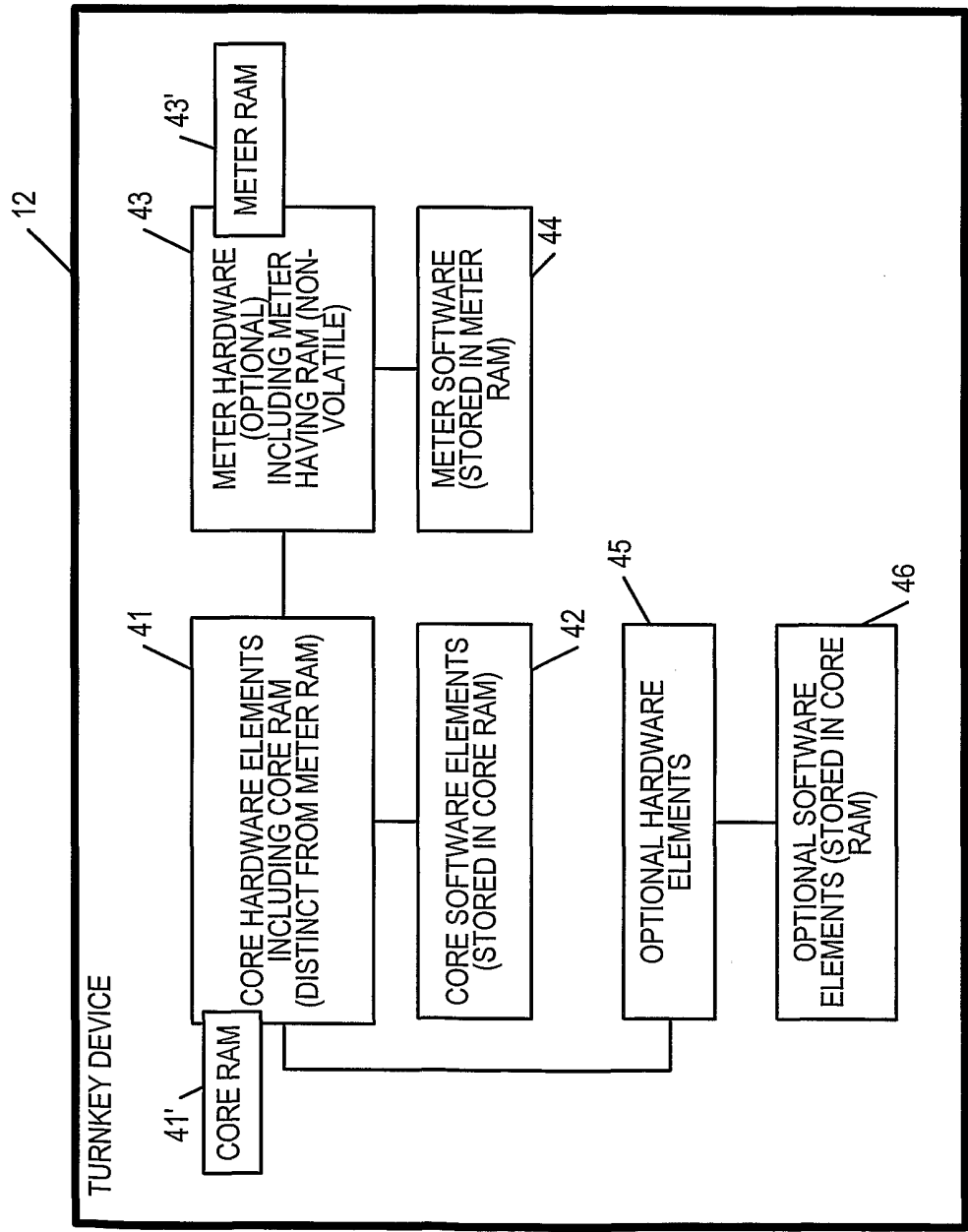


FIG. 2

INTERNATIONAL SEARCH REPORT

International application No.

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A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G07B 17/00

US CL : 705/410

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)

U.S. : 705/410,705/401-403,64,71; 380/259,260,277-286

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 practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,612,884 A (HAINES) 18 March 1997 (18.03.1997), see entire document	1-16
A	US 5,459,670 A (JOHNSON et al) 17 October 1995 (17.10.1995), see entire document	2,9
A	US 6,098,058 A (GRAVELL et al.) 01 August 2000 (01.08.2000), see entire document	1-16
A	US 6,081,795 A (RYAN, Jr.) 27 June 2000 (27.06.2000), see entire document	1-16



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	"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
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"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

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