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(54) **Washing machine with user interface cooperating with remotely accessible data media**

(57) A laundry washing machine (10) comprising an user interface (12) and identification means (18,20,22) able to capture automatically data stored on a remotely accessible data media (24). The user interface (12) is in a working condition only when said remotely accessible data media (24) is within a predetermined distance from the appliance, so that the washing machine (10) can be used only by a person carrying such media (24).

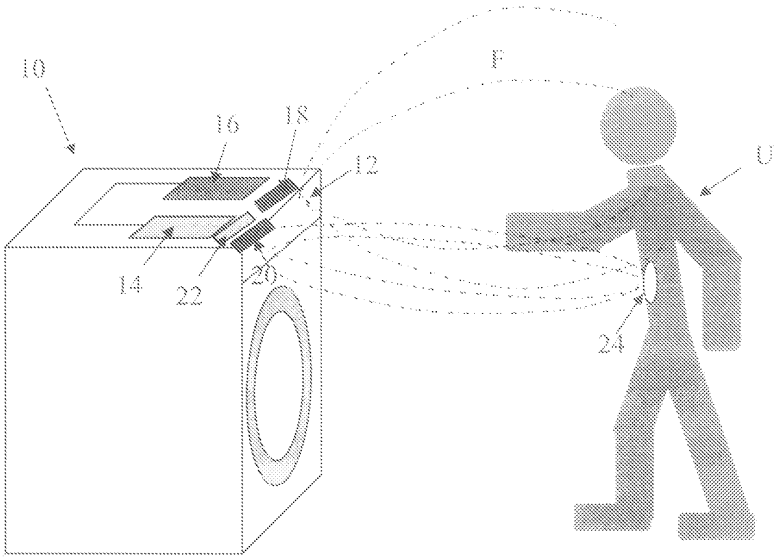

Figure 1

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Description

[0001] The present invention relates to a household appliance, particularly a laundry washing machine or a dishwashing machine, comprising a user interface and identification means able to capture automatically data stored on a remotely accessible data media.

[0002] This kind of domestic appliances, particularly a cooking oven, is known from EP-A-1193584 where the user interface is substantially by-passed by data received directly from a remotely accessible data media associated with the food packaging. Even if this automatic feed of data to the control process unit of the appliance may be useful in certain cases, this is limited to cooking appliance where it is possible to link a certain food to a predetermined cooking program. This is not certainly the case in other kinds of appliances, like washers or dishwashers, where there is still the unsolved problem of allowing a proper use of the appliance only to a certain person or to a certain group of persons.

[0003] Apartment buildings usually have a shared laundry room in which each household may put up its own private washer and/or laundry dryer, or washer-dryer. A common problem in such shared rooms is the misuse of these appliances by persons who are not the owners, shifting the cost of appliance wear, supply water, and electrical energy to the owners.

[0004] Today the problem either remains unsolved or it is dealt with by covering each power supply socket with a lid, usually a simple plastic part of no particular robustness, which can be locked with a mechanical key. Disadvantages are that:

- the owner can forget to lock the socket;
- even if the socket nearest to the appliance is locked, it can still happen that another nearby power supply socket is open. In this case the appliance can still be run by an unauthorized person;
- it is relatively easy to break open a socket lid with simple mechanical tools, e.g. by pushing a screwdriver into the slot between the lid and the socket.

[0005] The cost of a full set of locks and keys for a laundry room can be considerable, yet this cost is often wasted on lids of poor mechanical durability.

[0006] EP-A-0978773 discloses a washing machine where the user interface can be activated only by entering an access code. Only when this code is entered, the machine system can be activated. This known system implies that the user firstly remembers the access code, and secondly that he/she has some familiarities with keyboards and access codes.

[0007] It is an object of the present invention to provide an authorization system that is linked directly to the appliance and its owner, with authorization means that is easy to carry along, wireless, cheap, and requires neither a mechanical key, nor the typing of a password / PIN, nor the pressing of a button combination, nor other direct user interaction. The appliance itself shall not run a program cycle unless the user is automatically authorized.

[0008] According to another technical problem underlying the present invention, investigations have revealed an alarming number of households in which children were caught playing, or are even allowed by their parents to play, in laundry washers or dryers. Consequences can be lethal if one child is locked in the appliance and another child starts it. Most household appliances have no provisions against children starting them unless a special child lock is activated. Even if there is "only" laundry in the appliance, it can be seriously damaged by an arbitrarily selected wash cycle.

[0009] There are also many cases reported of cooktops operated by children, or even by cats walking over them, resulting in obvious hazardous situations.

[0010] Making a household appliance child safe usually requires particular effort from the user. State-of-the-art methods are:

- button combinations for child lock and unlocking, especially such combinations that require a certain size of the hands. Disadvantages: a standard hand size has to be assumed for this. If the chosen size is relatively small, children with large hands can unlock the appliance. If it is chosen a large size, adults with small hands will not be able to operate the child lock. This solution is also unsuitable for people who have poor motor skills due to age, injury, or disability, or for people suffering from a disturbance of growth. Moreover this solution cannot prevent operation through e.g. a mentally handicapped adult household member;
- mechanical provisions, e.g. a locking screw that will prevent operation of the door lock and thereby, indirectly, running of a program cycle. Locking and unlocking is accomplished by turning the screw with a tool or a coin. Disadvantages: children can learn to unlock a mechanical child lock. Again, the tightness of a mechanical child locking mechanism is a tradeoff assuming that "a normal adult can operate it, a normal child aged up to 10 years cannot". Most, but not all grown up people and children will fulfill this assumption.

[0011] Another object of the present invention is to securely prevent accidents caused by unauthorized operation. This shall be achieved through an authorization system which, on the user side, is easy to carry along, wireless, cheap, not requiring mechanical tools or pressing of button combinations. The appliance shall not exert any safety relevant action (such as door locking, water inlet, heating, or movement) unless started by an authorized user.

[0012] A further problem underlying the present invention relates to the way in which a domestic appliance can be driven in a service mode.

[0013] Many modern household appliances, e.g. laun-

dry washers or dryers, offer a diagnostic mode to assist service staff in finding failure causes. The diagnostic mode is usually activated by pressing a button combination on the user interface (buttons pressed in a particular sequence, or simultaneously, or for a certain number of seconds). For example a failure history stored in the appliance control, e.g. in an EPROM, will be given out on the display of the appliance upon activation of the diagnostic mode.

[0014] In diagnostic mode safety functions can be deactivated, e.g. a washer will not interrupt spinning in the case of unbalance and/or heating will not be interrupted if the water level falls below the safety level in a washer. This can have severe consequences if the service mode is activated accidentally by a non-service user. Concerning the aforementioned examples, deactivation of heater safety can lead to combustion in the worst case, or to failure of the heating element in a less severe case. If unbalance is not reacted to, the appliance can lose its stable position. In the worst case people can be injured. If the appliance stands on a pedestal it can fall from it and it can be damaged. In less severe cases mechanical damage can be done to parts of the appliance if the tub of the washer hits the cabinet.

[0015] If more detailed information from the appliance control is needed, the service staff usually has to remove the worktop or cover plate, or another panel of the appliance cabinet, to access the control board and read out data via an interface on the control board, a plug, cable, and e.g. a laptop. This involves numerous work steps and is especially inconvenient if the appliance is set up in a narrow space - which, more often than not, is the case in households - or if the appliance in question is a washer with a dryer on top of it.

[0016] The implementation of the diagnostic mode button combination is costly. It requires programming effort and testing effort in development. It increases software complexity and requires processor space.

[0017] According to an embodiment of the present invention, the diagnostic mode shall only be activated if an authorized service person is present. It shall automatically be deactivated afterwards. Activation shall be realized with a convenient wireless authorization system of low cost.

[0018] Another problem underlying the present invention is how to adapt an appliance according to different preferences shared by several members of the same household. In many households several users with different needs or different levels of experience and understanding are sharing one washer or other household appliance. Reasons can be:

- Partners are sharing e.g. laundering work, sometimes based on laundry types, e.g. with one partner laundering the whites, the other partner the colored fabrics;
- The person who is usually in charge of e.g. washing wishes to delegate the task to other household members, or has to delegate it e.g. due to illness or temporary absence;
- The household is a flat-sharing community with each community member e.g. doing their own laundry. Such communities are popular in university cities and a great number of them have members of several different nationalities, with different native languages and different habits.

[0019] Currently no appliances are offered which conveniently accommodate such diverse needs. In particular there is no known appliance in which different operational concepts of the user interface or user dialogue can be selected to match the differing experience, habits, or conceptions of several users.

[0020] According to the present state-of-the art, appliances have a few possibilities to set user preferences. Especially appliances with LCD displays can usually store preferences such as the display language and program and option settings for a few "favorite" programs of the user. However there are no known appliances which can store several sets of preferences for different users, or even different operational concepts for different users.

[0021] With the term "professional user" concept we mean a setting of the appliance for an experienced user who wants to choose from a large selection of settings. The selections possible on the user interface are, for example:

- Wash program (e.g. Cotton White, Cotton Color, Easy Care, Delicates, Wool, Hand wash, Rinse & Spin),
- Wash temperature,
- Spin speed for final spinning,
- Options such as increased wash water level, Intensive Rinse, Pre-wash, Eco With the term "one-stepper" approach we mean a setting of the appliance for a user who has little or no experience, or who is seeking to reduce effort and/or prefers easy and simple selections. The selections possible are, for example:

- Fibre type (e.g. Cotton, Synthetics, Wool, Mixed Fibres) or laundry type (e.g. bed linen, sportswear, sweaters & socks, fashion wear, T-Shirts, Jeans, lingerie, curtains,...),
- Color (e.g. white, dark, lightly colored, bright-colored, mixed),
- Soil level (e.g. stained, heavily soiled, medium, lightly soiled, only odors),

[0022] A further object of the present invention is to provide an appliance that will then automatically set an appropriate setting of programs, temperatures, spin speeds, and additions such as pre-washes. It is also possible to support the user in his selections by guiding him through a user dialogue on the user interface (example: help the user to identify the stain type).

[0023] Therefore, according to a further embodiment of the present invention, the appliance will have a system which is able to store user preferences for each user separately, including the preferred operational concept of the user interface or user dialogue for each user, and which can identify the approaching user and switch to this user's preferences automatically.

[0024] This identification system shall be, on the user side, easy to carry along, wireless, low-cost, and convenient to use, requiring neither tools nor keys nor memorizing and typing of a numeral code, password, or button combination.

[0025] The above objects are reached according to the features listed in the appended claims.

[0026] Further features and advantages of a domestic appliance according to the present invention will be clear from the following detailed description, provided as a not limiting example, with reference to the attached drawings in which:

- figure 1 is a schematic view of how a domestic appliance (in this case a washer) according to a first embodiment of the present invention is working; and
- figure 2 is a schematic diagram of how a domestic appliance is working according to a second embodiment of the invention.

[0027] With reference to figure 1, a washing machine 10 presents a user interface 12 connected to a grounded control board 14. This board is also connected to an alternating electric field source 16 (frequency generator) and is provided with a first coupling interface 18, a second coupling interface 20 and a signal receiver 22.

[0028] An extremely long-wave (quasistatic) alternating electric field (e.g. 1000 kHz) is created by the frequency generator 16 (current source plus oscillator and modulation), also known as "ZPS server", i.e. Zero Power Switch server. The technology of extremely long-wave alternating electric field is known from WO-A-2007/054349, US-A-2006/0261672 and WO-A-2007/000353 and therefore will not here be disclosed further. Through antennas and a coupling interface, e.g. a copper plate, the maximum of the electric field strength is directed towards a particular space (near field), identified in figure 1 with F. The identification of an authorized user U is accomplished by means of a Zero Power Switch (ZPS) device 24, called "ZPS client", which is worn or carried by the user U. The ZPS client 24 is a low-cost capacitive switch with very low, near-zero power consumption. It can be integrated in a smartcard, a solid token-like metal cylinder, or another device that is both robust and easy to carry along. The Zero Power Switch server 16 comprises the first coupling interface 18 and an oscillator with a fixed frequency output in the range of 0 to 10 kHz. This fixed frequency is functioning as an identification signature. When the user U wearing the ZPS identification device 24 (ZPS client) is entering the quasistatic electric field F, the ZPS server 16 will execute a switching process, whereupon it will couple an electromagnetic signal of its characteristic frequency back into the field F. The user U is assumed to be grounded via the floor of the room. The change in the electric field initiated by the ZPS switching 16 can be detected by the signal receiver 22 and evaluated in the control board 14. By means of a "fast Fourier transform" the frequency emitted by the ZPS client 24 can be identified and compared to a preset authorization signal stored in the control board 14. Only in the case the frequency emitted by the ZPS client 24 corresponds, in a certain predetermined tolerance range, to the signal stored in the control board 14, the user interface 12 of the appliance 10 will be driven in a active working condition according to which it can be actually used by the user U. On the contrary, every action on any button, lever, knob etc. on the user interface 12 will have no effect on the appliance itself.

[0029] In the example according to figure 1 the electric field generator 16 is placed inside the user interface 12 of the washer 10, which of course could be also a laundry dryer, a dishwasher, a cooktop or an oven. The field maximum is directed towards the space in front of the appliance 10 that will normally be occupied by the user U intending to operate the appliance. The distance covered by the field F should reach about 1 m measured from the appliance control board 14. The authorized user U is equipped with the ZPS client device 24. When the user U approaches the appliance, this latter will receive an authorization signal from the ZPS client device 24. The signal frequency is identified in the appliance control and compared to a predefined authorization signal. If the appliance 10 has a "Start" button on the user interface, it will only react to activation if an authorization signal from the ZPS is received approximately simultaneously, e.g. within a predetermined time span (for instance two seconds), with the pressing of the button. If only selector buttons and rotary selectors are present, such as in cooktops or ovens, no action (e.g. heating) is started unless the authorization signal is detected in a near-simultaneous time span. A feedback is given to the user, e.g. a sound signal, LED light, or message on an LCD or seven-segment display, to indicate when the appliance is unlocked and can be started.

[0030] Since the appliance will only react to operation if an authorization signal from the ZPS worn by the authorized user U is received approximately simultaneously, children or persons of diminished responsibility or pets cannot start the appliance.

[0031] According to a further embodiment, the zero power switch can be a ZPS client device, e.g. a ZPS integrated in a card of credit-card format or by a chip-shaped device. It is then possible to create cards that do not only authorize the use of the appliance, but also combine programs with the most frequently chosen options. The cards, chips, or other ZPS client devices can be labeled in Braille or with intuitive palpable pictograms or with some other unambiguous code.

[0032] According to another embodiment, particularly

for washing machine to be used by blind people or by people having no expertise in washing laundry, each fabric type and each soil level is represented by a ZPS client device. A palpable sample of fabric and a palpable coding of the soil level are integrated in each ZPS client device. When the user with the client device approaches the appliance, this latter not only is automatically enabled to carry out the washing process, but it automatically sets the appropriate program and options for optimum fabric care and cleaning performance.

[0033] This approach is very intuitive and helps even a user of no laundering expertise to activate the correct program and options. According to this embodiment, combinations with Braille labeling or palpable pictograms are also possible.

[0034] Adapted versions of these cards are also very useful for facilitating delegation of laundering tasks. With the authorization/program cards it is no longer necessary for a household member experienced in laundering to explain the correct program and option selection to an inexperienced user. It is sufficient to hand the appropriate card or cards to him. On approach of the user with the card the appliance will automatically set the right program and options. As errors can be excluded and laundry damage or bad wash performance can be prevented, an experienced household member will be less reluctant to delegate the task, and absence of the experienced user will be less of a problem. Moreover, as the cards can be designed to be very intuitive, inexperienced users will quickly learn to choose the right cards themselves.

[0035] According to a further embodiment of the invention schematically shown in figure 2, the user identification is used for authorizing service staff in order to release and automatically activate the diagnostic mode of the appliance. One or several characteristic ZPS frequencies must be reserved for the service staffs ZPS client devices. If one of these characteristic frequencies is coupled into the field, it will be detected via the signal receiver and its signature can be read by the appliance control. The appliance control will then activate the service mode and, for example, give out a failure history on the display.

[0036] A major advantage of this embodiment is that a wireless data transfer is possible. This eliminates the great inconvenience of having to remove the worktop and wire the appliance control to a laptop in order to read out detailed data, e.g. EPROM entries from the appliance control. Reading out of data can be accomplished as shown in Figure 2. In block 30 of the diagram the service person with the ZPS client device approaches the appliance. In blocks 32 to 35 the appliance signal receiver detects the frequency of the ZPS device, triggers the appliance control access data on EPROM and such data are transferred to the appliance field emitter in order to modulate the electric field around the appliance. In blocks 36 and 38 the signal receiver carried by the service person detects, decodes and displays the data to the service person.

[0037] According to a further embodiment of the invention, the user identification device can also store user preferences, and a feedback about the settings is displayed.

[0038] If the appliance is equipped with a user interface which permits a user dialogue, e.g. a user interface disposing of a liquid crystal display or the appearance of which can be changed, e.g. a touch screen, it is possible not only to set favorite programs and options for each user, but also to set the right display language for each user separately. A particular benefit of the invention is the possibility to adapt the operational concept of the appliance to the degree of experience, understanding, and preferred simplicity or professionalism of use for each user. For example some users can be treated as one-steppers, others as professional users.

[0039] A similar wireless authorization and identification can be accomplished with radiofrequency identification devices (RFID) through a radiofrequency electrical field server in the appliance and a RFID tag worn by the user. Like ZPSs, RFID tags are relatively low-cost and can also be operated passively, not requiring a battery power supply of their own. Especially for the program card embodiment (program cards for visually impaired users), a RFID server and RFID tags are a very appropriate solution.

[0040] Other wireless technologies can also be employed, e.g. communication via cellular phone networks or Bluetooth, WLAN, DECT (electrical fields), infrared emitters and receivers (optical electromagnetic waves), or protocols using a magnetic field.

[0041] For the program card embodiment it is also possible to direct the field towards the inside of the appliance or to integrate e.g. a RFID reader in the frame of the appliance door or in the door itself. Program cards can be enlarged and encapsulated against moisture and heat so that they can withstand washing or drying cycles and will not get caught, damaged or lost in the gap between the door bellow and the drum of e.g. a washer. In this case the program card can be added to the laundry. This is very convenient. For example an experienced user can sort the laundry into different baskets and place the appropriate laundry card into each basket. The inexperienced user, to whom the task is delegated, does not have to hold the card up in front of the appliance. His task is reduced to loading the entire content of the basket e.g. into the washer, which will automatically select the right settings. No search for the right card is necessary if the wash cycle is to be followed by a drying cycle. The laundry including the card can be removed from the washer and put into the dryer, which will automatically set the right program as well.

Claims

1. Household appliance, particularly laundry washing machine (10) or dishwashing machine, comprising a user interface (12) and identification means (18,

20, 22) able to capture automatically data stored on a remotely accessible data media (24), **characterized in that** the user interface (12) is in a working condition only when said remotely accessible data media (24) is within a predetermined distance from the appliance (10).

2. Household appliance according to claim 1, wherein said identification means comprise a frequency generator of quasistatic alternating electric field, said remotely accessible data media (24) comprising a capacitive switch.

3. Household appliance according to claim 1, wherein said identification means comprise a radiofrequency transmitter/receiver, the remotely accessible data media (24) comprising a radiofrequency identification device.

4. Household appliance according to any of the preceding claims, wherein said remotely accessible data media (24) contain data automatically enabling the appliance to be set in a service mode.

5. Household appliance according to any of claims 1-3, wherein said remotely accessible data media (24) contain data related to predetermined preferences of a specific user (U), so that the user interface (12) is automatically configured to such preferences.

6. Household appliance according to any of the preceding claims, wherein said remotely accessible data media (24) are chosen in the group consisting of cards, chip devices, labeled cards or the like.

7. Household appliance according to any of the preceding claims, particularly laundry washing machine, wherein said remotely accessible data media (24) are each linked to a specific type of fabric and/or soil level.

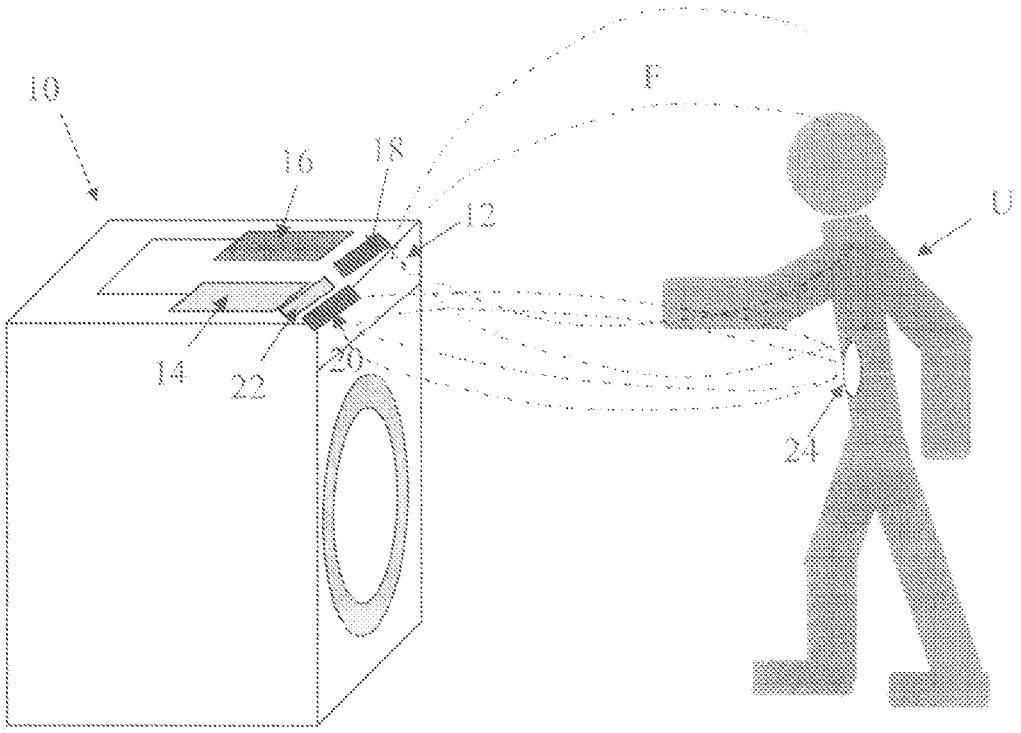

Figure 1

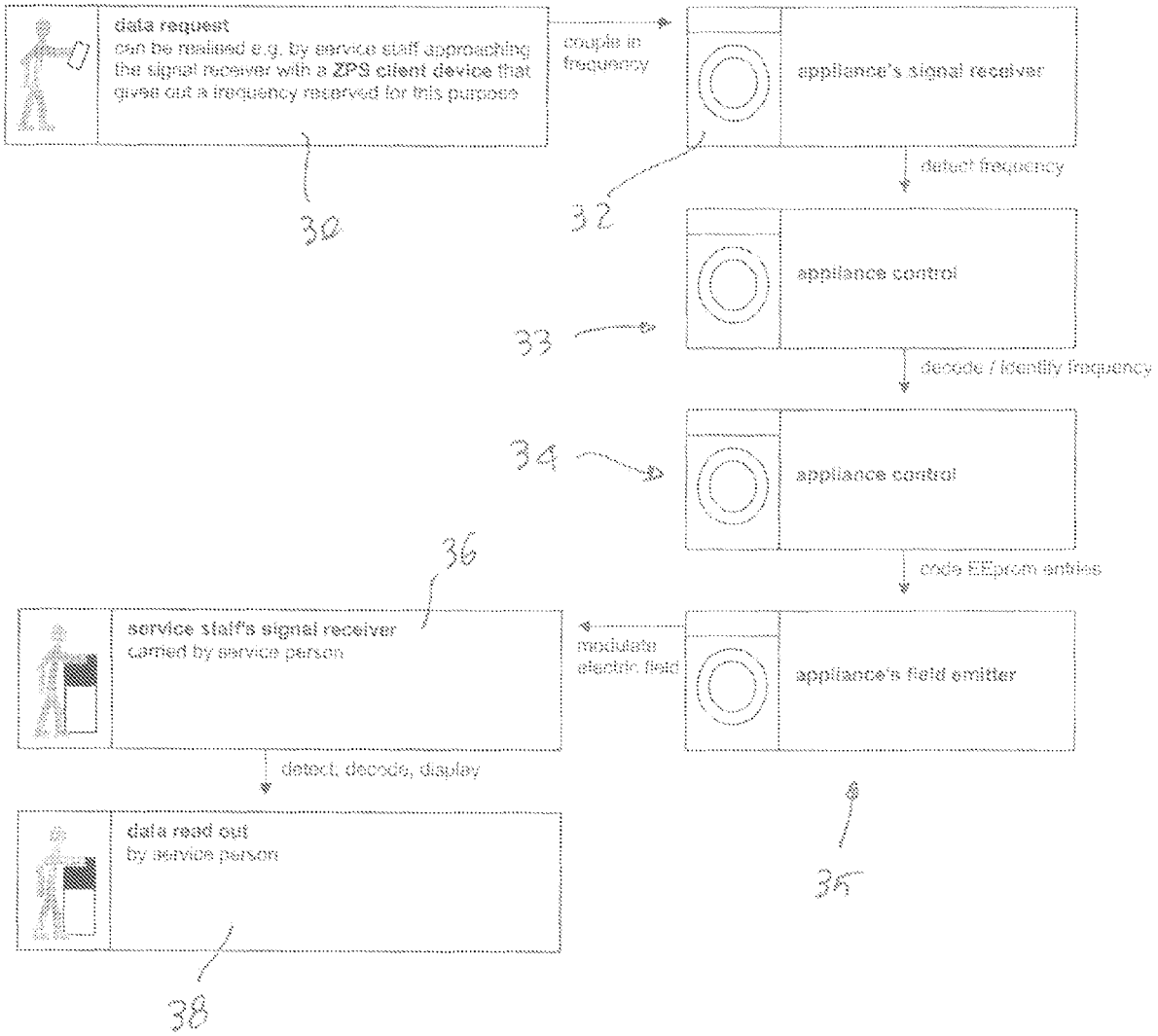
data request
can be realised e.g. by service staff approaching the signal receiver with a ZPS client device that gives out a frequency reserved for this purpose
couple in frequency
appliance's signal receiver
detect frequency
appliance control
decode / identify frequency
appliance control
code EEprom entries
appliance's field emitter
modulate electric field
service staff's signal receiver
carried by service person
detect, decode, display
data read out
by service person
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Figure 2

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 12 2669

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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TECHNICAL FIELDS SEARCHED (IPC)

D06F
A47L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	20 May 2008	Clivio, Eugenio

CATEGORY OF CITED DOCUMENTS

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20-05-2008

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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