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(54)

SYSTEM FOR TREATING TEXTILE ARTICLES

(57)

System for treating textile articles comprising a household appliance (10) with a plurality of selectable programs, a portable apparatus (100) comprising first means (20) for analyzing at least one textile article (2), a portable equipment (30) in signal communication with said first means (20), an assessment unit (40) in signal communication with said portable equipment (30) for detecting the nature of said at least one textile article (2) analyzed by said first means (20), said first means (20) being configured to direct direct an electromagnetic radiation toward the textile article (2) to be analyzed, to receive the electromagnetic radiation reflected from the textile article (2) to be analyzed and to generate a first signal (S1) representative of the reflected electromagnetic radiation, to transmit the first signal (S1) to said portable equipment (30), said portable equipment (30) being configured to receive the first signal (S1) transmitted by said first means (20) and send the first signal (S1) to the assessment unit (40), said assessment unit (40) being configured to receive and process the first signal (S1) to generate, in response to the first signal (S1), a second signal (S2) representative of a treatment program of the household appliance (10), to be selected for the at least one textile article (2) that has been analyzed.

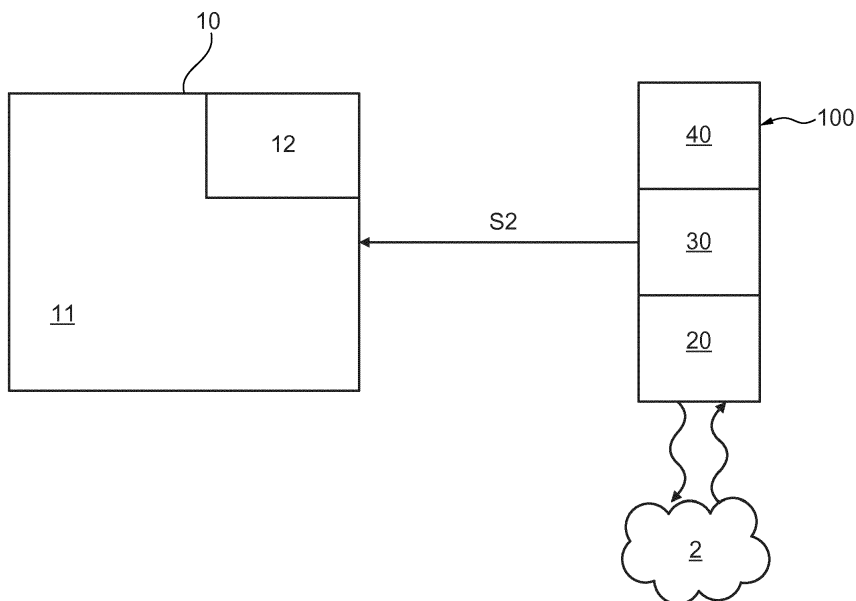


Fig. 1

Description

Field of the Invention

[0001] The present invention relates to a system for treating textile articles.

[0002] Particularly, the present invention concerns a system that can identify the type of articles to be treated and select a treatment program of a household appliance such as a laundry washing machine, a laundry drying machine or a washer-drier combo.

Background art

[0003] The prior art shows devices and washing machines that can identify the type of articles to be washed to determine the most suitable washing program.

[0004] DE 4309914 discloses a microcomputer/optical scanner combination. The fabric has an optically readable label containing an ID code (barcode) and is automatically recognized by the optical scanner, which in turn sends the fabric-related information to the microcomputer. The latter automatically identifies the optimal washing program for that particular fabric. Nevertheless, this technical arrangement doesn't afford direct type-detection for fabrics that have no barcode label.

[0005] EP 612996 discloses a method and an instrument for optical detection of a fabric type by diffuse reflection infrared spectroscopy, and fabric classification. Particularly, in the case of a household iron, the instrument can identify the characteristics of the fabric and accordingly change the surface temperature of the iron.

[0006] WO 2004053220 discloses a method of identifying the parameters (type, color) of fabrics being washed, by spectrometric analysis of the electromagnetic radiation reflected from the fabric and comparison thereof with characteristic spectra of reference materials. This document also discloses automatic selection of the optimal dirty fabric treatment.

[0007] WO 2001046509 discloses the identification of the type and color of fabrics by reflected infrared (IR) radiation analysis. In the particular case of a washing machine, instant assessment of the fabrics in the washing machine is provided, to afford selection of the optimal washing program, in view of preventing damages and discoloring of the articles of clothing.

[0008] The document DE 19855303 discloses a washing machine having a handpiece and a computer with a database, for spectroscopic fabric type identification. Signals are processed within the washing machine.

[0009] The above discussed systems use complex algorithms that process the spectrum of the reflected electromagnetic radiation for recognition of the fabric being analyzed. These algorithms require a processing unit with a considerable computing power, which will lead to an increase of the overall cost of the household appliance, that users often consider unjustified for the improvement achieved, especially in medium-low cost

household appliances. This has prevented widespread use of these systems heretofore.

Object of the present invention

[0010] The object of the present invention is to provide a system that can obviate prior art drawbacks, while reducing the cost of the systems and allowing use thereof also by owners of household appliances that do not have the required computing power.

[0011] This object is fulfilled by a system as defined in claim 1 below.

Advantages of the present invention

[0012] In one embodiment, the present invention allows a user to analyze a textile article using a single portable apparatus that has all the features required to identify the treatment program to be selected for the article being analyzed.

[0013] The present invention allows the user to analyze a textile article using a portable device and to identify the treatment program to be selected for the article being analyzed using mobile equipment such as a smartphone.

[0014] The present invention also applies to household appliances that have no article-analyzing devices and no associated electronics for recognizing the spectrum of the fabrics being analyzed.

Brief description of the drawings

[0015] The invention will be now described in greater detail with reference to a preferred embodiment thereof, given by way of illustration and without limitation, and shown in the annexed drawings, in which:

- Figure 1 shows a block diagram of a first embodiment of the system of the present invention,
- Figure 2 shows a block diagram of a first embodiment of the system of the present invention,
- Figure 3 shows a block diagram of an embodiment of the system of Figure 2.

DETAILED DESCRIPTION

[0016] The system as shown in the accompanying figures shall be deemed to be schematically illustrated, not necessarily drawn to scale, and not necessarily representing the actual proportions of its parts.

[0017] Although this is not expressly shown, the individual features described with reference to each embodiment shall be intended as auxiliary and/or interchangeable with other features, as described with reference to other embodiments.

[0018] Referring to Figure 1, there is shown a first embodiment of the system 1 for treating textile articles 2. In this first embodiment, the system comprises a household appliance 10 and a portable apparatus 100. Such appa-

ratus 100 comprises a frame with the means 20, 30 and 40 required for analysis of the fabric 2, accommodated therein.

[0019] Advantageously, in the first embodiment, the portable apparatus 100 integrates all the features for analyzing the fabric 2 so that a user 3 will not be required to use a plurality of devices.

[0020] Referring to figures 2 and 3, there is shown a second embodiment of the system 1, in which the means 20, 30 and 40 required for analysis of the fabric 2 may be independent of each other and/or incorporated one in the other as explained in greater detail hereinafter. In this second embodiment, the user 3 may use multiple devices, which leads to a lower cost of access as compared with the single apparatus 100 incorporating all the features.

[0021] In one aspect, the household appliance 10 comprises a basket 11 for holding one or more textile articles. This household appliance 10 may be a laundry washing machine, a laundry drying machine or a washer-dryer combo, for respectively washing, drying or both washing and drying the textile articles held within the basket 11.

[0022] Therefore, the household appliance 10 is equipped with an electric motor for rotating the basket and with members (not shown) for treating the textile articles held within the basket 11, particularly washing and/or drying members.

[0023] The household appliance 10 further comprises a program selection unit 12, that allows selection of an article treatment program among a plurality of selectable treatment programs. Such selection may be made manually, i.e. set by the user by means of a knob or a touch-screen, or automatically. The automatic selection mode will be discussed in greater detail hereinafter, with reference to one embodiment of the present invention.

[0024] The first means 20 are configured to analyze a textile article 2, particularly to detect the spectrum of the article 2 being analyzed.

[0025] The first means 20 which, referring to Figures 2 and 3 are embodied by a portable device 20 separate from the apparatus 100, comprise a generating element 21 for generating an electromagnetic radiation and directing the electromagnetic radiation toward a textile article 2 to be analyzed, a receiving element 22 for receiving the electromagnetic radiation reflected from the textile article 2 toward which the electromagnetic radiation has been directed, and generating a first signal S1, representative of the reflected electromagnetic radiation, and a transmitting element 23 for transmitting the first signal S1 received by the receiving element 22 to said second means 30.

[0026] As used hereinafter, the term portable is intended to designate a device that can be held by the hand of a user 3 with no particular effort.

[0027] According to one embodiment, the generating element 21 is configured to generate an electromagnetic radiation in the range of IR frequencies, namely in the near-IR spectrum, i.e. From 800 nm to 2,500 nm. Partic-

ularly, the generating element 21 is configured to generate an optical beam, preferably an IR optical beam, and direct such optical beam to the textile article 2 to be analyzed.

[0028] In operation, the textile article irradiated by the electromagnetic radiation emitted by the generating element 21 reflects parts of the incident electromagnetic radiation. Such reflected electromagnetic radiation is detected by the receiving element 22, e.g. a photodiode, and converted into the first signal S1 representative of the reflected electromagnetic radiation. The receiving element 22 is connected with the transmitting element 23, which is configured to receive the first signal S1 from the receiving element 22 and to transmit it to said second means 30 via a wireless transmission channel, e.g. Wi-Fi, NFC, Bluetooth.

[0029] The second means 30 which, referring to Figures 2 and 3 are embodied by portable equipment separate from the apparatus 100, comprise a receiving element 31 for receiving the first signal S1 transmitted by the first means 20, particularly the transmitting element 23, and a sending element 32 for sending the first signal S1 to the assessment unit 40.

[0030] Therefore, the second means 30 operate as an interface between the first means 20 and the assessment unit 40 which is designed to detect the nature of the textile article 2 being analyzed.

[0031] The second means 30, in the embodiment as shown in Figures 2 and 3 may be a smartphone, a tablet or any other type of mobile terminal having wireless communication means that allow said second means 30 to communicate with the first means 20 in wireless mode.

[0032] The assessment unit 40 is in signal communication with the second means 30 and is configured to detect the nature of the textile article 2 being analyzed, such as the nature of the fabric, the color and also the amount and nature of the dirt in the article, using the first means 20.

[0033] Then, the assessment unit 40 is configured to process the first signal S1 to generate, in response to the first signal S1, a second signal S2 representative of a program of the household appliance 10, to be selected for the textile article 2 that has been analyzed.

[0034] Particularly, the assessment unit 40 comprises a receiving element 41 which receives the first signal S1 from the sending element 32 of the second means 30, a processing element 42 which processes the first signal S1 to generate the second signal S2 and a sending element 43 which sends the second signal S2 to the second means 30.

[0035] Advantageously, the assessment unit 40 comprises an algorithm or an assessment software program 44 resident in a portion of the storage area of the assessment unit 40. The assessment software 44 is configured to process the first signal S1 with the reference spectra stored in a database of characteristic spectra of reference materials. This database resides, for instance, in another portion of the storage area of the assessment unit 40.

[0036] Such assessment software 44 is suitable to identify the type of material of the article 2 being analyzed and to identify the treatment program associated with the material so identified, to thereby generate the second signal S2.

[0037] Therefore, in one aspect, the assessment unit 40 is designed to compare the first signal S1 with the reference spectra stored in the storage unit using the assessment software 44 to identify the type of material of the article 2 being analyzed and to identify the treatment program associated with the material so identified to thereby generate the second signal S2.

[0038] In the embodiment as shown in Figures 2 and 3, the assessment unit 40 is incorporated in the second means 30.

[0039] In such scenario, the assessment unit 40 may make use of the processing unit of the second means 30 to process the first signal S1 and generate the second signal S2.

[0040] Advantageously, the software program 44 is also incorporated in the second means 30.

[0041] Alternatively, the database of characteristic spectra of reference materials and the software that associates a treatment program to each type of textile material of the article 2 being analyzed may be stored in a portion of the memory of a remote computer that may be accessed by the second means 30 via the mobile network connection.

[0042] According to either the embodiment of Figure 1 or the embodiment of Figures 2 and 3, associated with the manual program selection mode of the household appliance 10, the second means 30, regardless of whether or not they incorporate the assessment unit 40, comprise a user interface 33 and an interface element 34 that controls the user interface 33 to provide information representative of the second signal S2 to a user, through the user interface 33.

[0043] For this purpose, the interface element 34 is configured to receive the second signal S2 from the assessment unit 40, particularly from the sending element 43 of the assessment unit 40 and process such second signal S2 to control the user interface 33. In order to receive the second signal S2, the second means 30 are equipped with a receiving element, e.g. coinciding with the receiving element 31, or a distinct receiving element 35.

[0044] The user interface 33 is advantageously a graphics interface, such as a display. Particularly, the graphics interface 33 may display the program to be selected.

[0045] This embodiment is particularly advantageous for users 3 whose household appliance 10 has no wireless communication system, whereby program selection has to be made manually by the user, using the second means 30.

[0046] According to another embodiment, associated with the automatic program selection mode of the household appliance 10, the program selection unit 12 of the

household appliance 10 is connected to a receiving element 13 configured to receive the second signal S2 from the second means 30. Therefore, the second means 30, regardless of whether they incorporate or not the assessment unit 40, comprise a transmitting element, represented by the sending element 32 or by a distinct sending element, for transmitting the second signal S2 to the household appliance 10. As the second signal S2 is received, the program selection unit 12 selects the program associated with the second signal S2 so received and starts the operation of the household appliance 10 according to the selected program. Advantageously, the selection unit 12 may be controlled using the second means 30, which may send both the second signal S2 and a control signal for the household appliance 20 to the selection unit 12.

[0047] This embodiment is adapted for use by a user 3 whose household appliance 10 is equipped with wireless communication systems, whereby the second means 30 may directly communicate with the household appliance 10 and send the second signal S2 to the household appliance 10 for selection of the article treatment program associated therewith.

[0048] According to an alternative embodiment, the assessment unit 40 may either be a unit separate from the second means 30 and from the household appliance 10 or be directly incorporated in the household appliance 10.

[0049] In the embodiment in which the assessment unit 40 is a unit separate from the second means 30 and the household appliance 10, the assessment unit 40 may be a processing unit of a remote computer.

[0050] The connection of the second means 30 with the assessment unit 40, in the embodiment of Figures 2 and 3, may be provided by a network connection, e.g. a mobile network connection or a Wi-Fi connection.

[0051] Finally, if the assessment unit 40 is incorporated in the household appliance 10, a processing unit must be provided in the household appliance 10, for processing the first signal S1 and generating the second signal S2.

[0052] Once again it will be advantageous to incorporate the software program 44 in the processing unit of the household appliance 10 or provide access to a remote computer, which may store both the database of characteristic spectra of reference materials and the program 44 that associates a treatment program with each type of textile material of the article 2 being analyzed.

[0053] If the user 3 analyzes a load of textile articles to select a single program of the household appliance 10, the assessment unit 40 is designed to generate respective second signals S2 representative of corresponding treatment programs and process these second signals S2 to determine a single treatment program suitable for the load of articles that have been analyzed.

[0054] Those skilled in the art will appreciate that a number of changes and variants may be made to the above described system, still within the scope of the invention, as defined in the following claims.

Claims

1. A system (1) for treating textile articles, comprising;

- a household appliance (10) for treating textile articles according to a treatment program that can be selected among a plurality of available programs,

characterized in that it comprises:

- a portable apparatus (100) comprising first means (20) for analyzing at least one textile article (2);
- portable equipment (30), separate from said portable apparatus (100) and from said household appliance (10) and in signal communication with said first means (20);
- an assessment unit (40) in signal communication with said portable equipment (30) for determining the nature of said at least one textile article (2) analyzed by said first means (20),
- said first means (20) being configured to:

- generate an electromagnetic radiation and direct the electromagnetic radiation so generated toward the textile article (2) to be analyzed,

- receive the electromagnetic radiation reflected from the textile article (2) to be analyzed and generate a first signal (S1) representative of the reflected electromagnetic radiation,

- transmit the first signal (S1) to said portable equipment (30),

- said portable equipment (30) being configured to:

- receive the first signal (S1) transmitted by said first means (20) and transmit the first signal (S1) to the assessment unit (40),

- said assessment unit (40) being configured to:

- receive and process the first signal (S1) to generate, in response to the first signal (S1), a second signal (S2) representative of a treatment program of the household appliance (10), to be selected for the at least one textile article (2) that has been analyzed,

- said assessment unit (40) comprising a transmitting unit (32) configured to transmit said second signal (S2) to said household appliance (10).

2. A system for treating textile articles as claimed in claim 1, wherein said assessment unit (40) comprises an assessment software program (44), which is configured to compare the first signal (S1) with ref-

erence spectra stored in a storage portion of said assessment unit (40) to identify the type of textile material of the article (2) being analyzed and identify the treatment program associated with the textile material so identified to thereby generate the second signal (S2).

3. A system (1) for treating textile articles as claimed in any of claims 1 to 2, wherein said assessment unit (40) is incorporated in said second means (30).

4. A system (1) for treating textile articles is claimed in claim 1, wherein said portable equipment (30) comprises a user interface (33) which is designed to provide a user with information representative of the treatment program of the household appliance (10) to be selected, in association with the second signal (S2).

5. A system (1) for treating textile articles as claimed in any of claims 1 to 4, wherein said first means (20) comprise:

- a generating element (21) for generating an electromagnetic radiation and directing the electromagnetic radiation toward the at least one textile article (2) to be analyzed,

- a receiving element (22) for receiving the electromagnetic radiation reflected from the textile article (2) and generating a first signal (S1) representative of the reflected electromagnetic radiation,

- a transmitting element (23) for transmitting the first signal (S1) to said second means (30).

6. A system (1) for treating textile articles as claimed in claim 1, wherein:

- the household appliance (10) comprises a program selection unit (12) for selecting an article treatment program among the plurality of available treatment programs,

- the program selection unit (12) is connected to a receiving element (13) which is configured to receive the second signal (S2) from said assessment unit (40),

- as the second signal (S2) is received, the program selection unit (12) selects the program associated with the second signal (S2) so received and starts the operation of the household appliance (10) according to the selected program.

7. A system (1) for treating textile articles as claimed in claim 1, wherein:

- the assessment unit (40) is incorporated in said portable equipment (30),

- said portable equipment (30) is adapted to be

connected to a remote computer having a storage unit which stores a database of characteristic spectra of reference materials and a database that associates a treatment program to each type of textile material of the article (2) being analyzed 5

8. A system (1) for treating textile articles as claimed in claim 1, wherein:

- the assessment unit (40) is at processing unit of a remote computer which is adapted to be connected to said portable equipment (30) via a wireless connection. 10

9. A system (1) for treating textile articles as claimed in claim 1, wherein said portable equipment (30) is a smartphone or a tablet. 15

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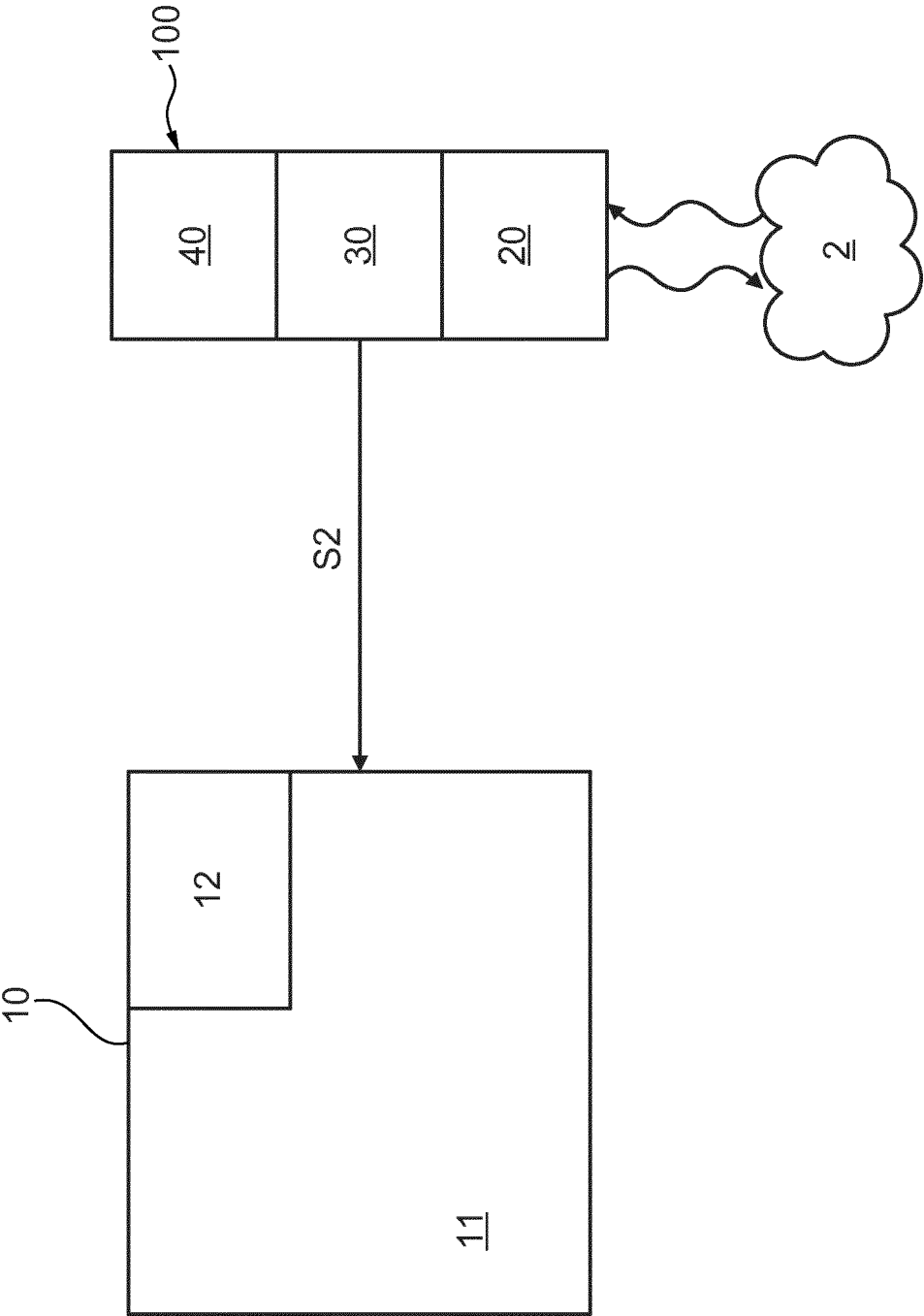


Fig. 1

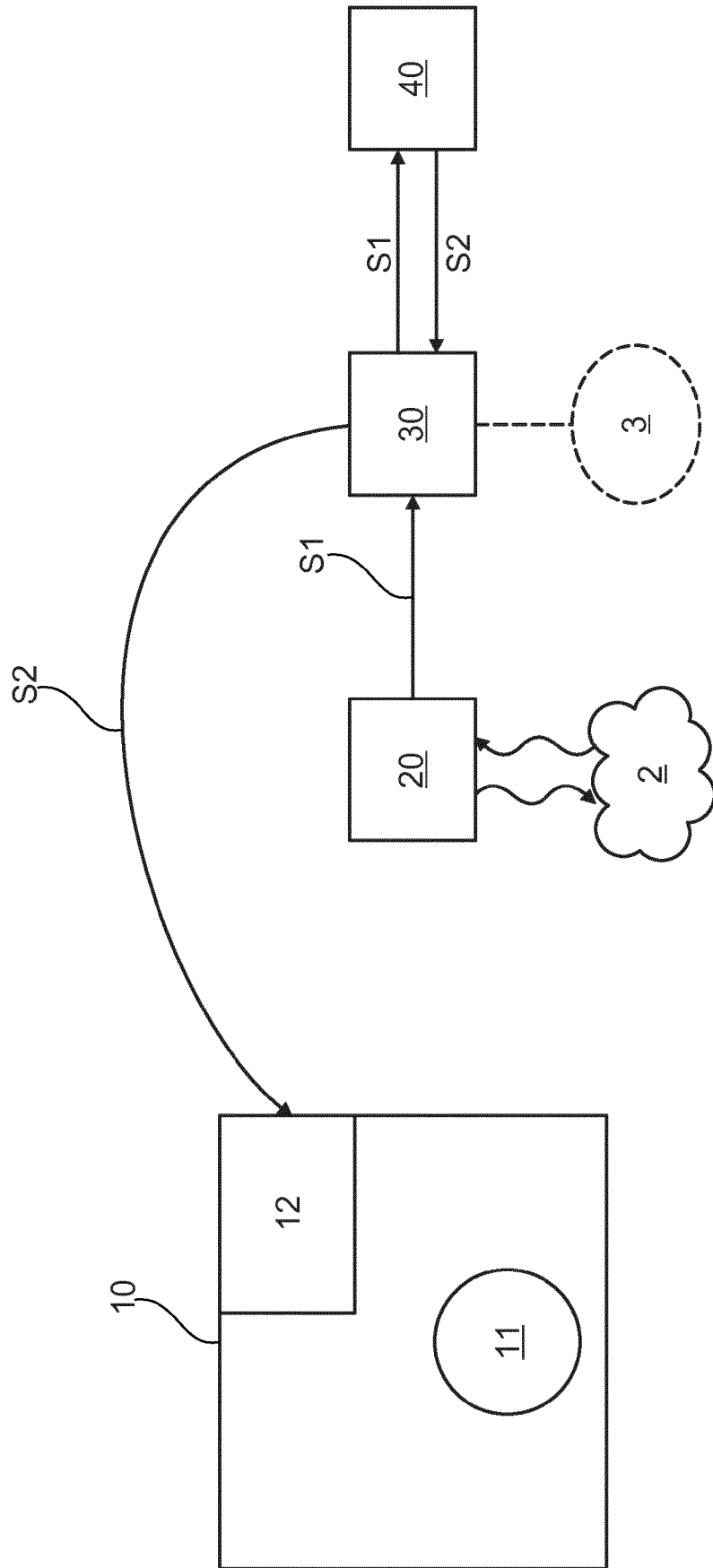


Fig. 2

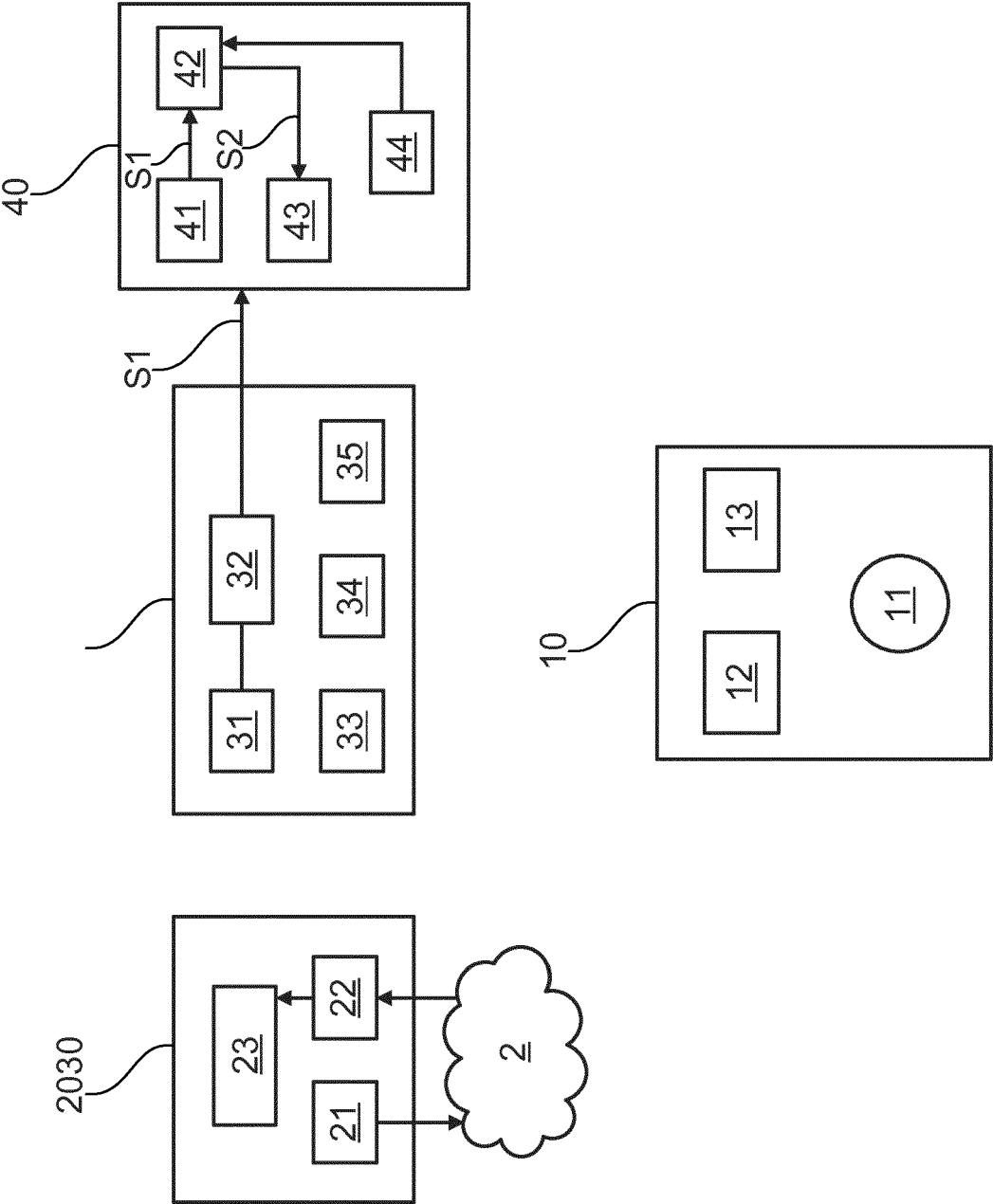


Fig. 3



EUROPEAN SEARCH REPORT

Application Number
EP 16 19 4730

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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 16 February 2017	Examiner Clivio, Eugenio
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	

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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5 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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