

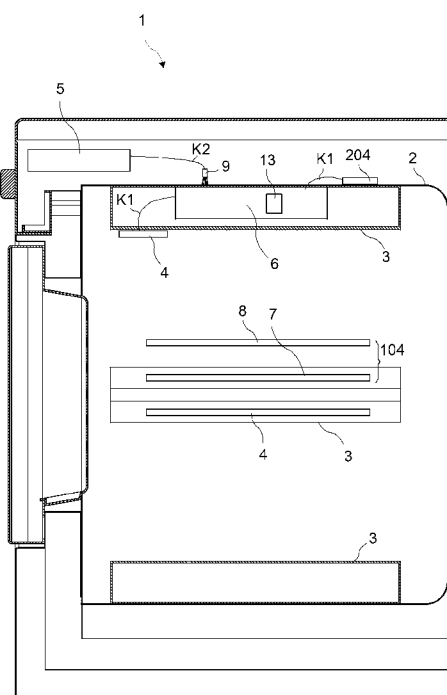


- | | |
|--|--|
| <p>(51) International Patent Classification:
 D06F 58/28 (2006.01) D06F 25/00 (2006.01)
 D06F 37/06 (2006.01) D06F 33/02 (2006.01)
 D06F 37/14 (2006.01)</p> | <p>(81) Designated States (<i>unless otherwise indicated, for every kind of national protection available</i>): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.</p> |
| <p>(21) International Application Number:
 PCT/EP2013/060284</p> | |
| <p>(22) International Filing Date:
 17 May 2013 (17.05.2013)</p> | |
| <p>(25) Filing Language:
 English</p> | |
| <p>(26) Publication Language:
 English</p> | |
| <p>(30) Priority Data:
 A 2012/06625 6 June 2012 (06.06.2012) TR</p> | <p>(84) Designated States (<i>unless otherwise indicated, for every kind of regional protection available</i>): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).</p> |
| <p>(71) Applicant: ARCELIK ANONIM SIRKETI [TR/TR]; E5 Ankara Asfalti Uzeri, Tuzla, 34950 Istanbul (TR).</p> | |
| <p>(72) Inventor; and</p> | |
| <p>(71) Applicant : OZKAHRAMAN, Hakan [TR/TR]; E5 Ankara Asfalti Uzeri, Tuzla, 34950 Istanbul (TR).</p> | |

[Continued on next page]

- (54) Title:** LAUNDRY WASHING/DRYING MACHINE

Figure 1



- (57) Abstract:** The present invention relates to a laundry washing/drying machine (1) comprising a drum (2) wherein the laundry is placed, one or more than one baffle (3) mounted on the circular inner surface of the drum (2) that provides the tumbling of the laundry, one or more than one sensor (4, 104, 204) disposed in the drum (2), that provides the detection of parameters relating to laundry like humidity, temperature, load, type of laundry and water hardness, and a main control unit (5) that regulates the washing/drying operations.



Published:

— *with international search report (Art. 21(3))*

Description**LAUNDRY WASHING/DRYING MACHINE**

- [0001] The present invention relates to a laundry washing/drying machine wherein the washing and/or drying operations are controlled by measuring the parameters relating to laundry.
- [0002] In laundry washing/drying machines, the parameters of the laundry like humidity level, temperature, amount (load) should be measured in order to control the washing and/or drying operations. In the case that the mentioned parameters cannot be measured correctly, the washing and/or drying operations cannot be controlled properly, errors cannot be detected, the length of the washing and/or drying operations is prolonged and energy consumption increases. The data, detected by means of the sensors in the medium of the drum wherein the laundry is placed, is transferred to the main control unit situated outside the drum; however, data transfer is adversely affected due to the distance between the sensors and the main control unit and hence the cable lengths being long. The precision in data transfer from the sensors to the main control unit decreases, the data transfer cables are affected by electromagnetic noise originating from the mains and other electric devices in the outside environment, thereby resulting in loss of data.
- [0003] In the European Patent No. EP1961858, a laundry dryer is disclosed, wherein the degree of dryness of the laundry is determined by measuring the electrical resistance and/or conductivity of the laundry.
- [0004] In the European Patent No. EP1473402, a laundry dryer is disclosed, wherein the dryness degree of the laundry is detected by temperature and moisture sensors secured to a bulkhead having an air outlet opening from which the humid air in the drum is discharged.
- [0005] The aim of the present invention is the realization of a laundry washing/drying machine wherein parameters relating to the laundry like temperature, humidity and amount of load are measured correctly and safely.
- [0006] The laundry washing/drying machine realized in order to attain the aim of the present invention, explicated in the first claim and the respective

claims thereof, comprises an auxiliary control unit disposed at the inner region of the drum baffle, that converts the continuous analog signals symbolizing the data received from the laundry and/or the drum by means of various sensors to discrete digital signals by means of a microprocessor and delivers the discrete digital signals to the main control unit.

- [0007] In an embodiment of the present invention, the sensors, for example the temperature sensor, humidity sensor or the load sensor, are disposed on the drum baffle or on the drum in the vicinity of the baffle. The data is transferred to the auxiliary control unit by means of cables extending from the sensors to the interior of the baffle.
- [0008] In another embodiment of the present invention, the laundry washing/drying machine comprises a humidity sensor composed of a first electrode disposed on the drum baffle and a second electrode disposed on the inner surface of the drum. The baffle itself can be used as the first electrode and the drum itself as the second electrode.
- [0009] In another embodiment of the present invention, in the laundry washing/drying machine, the amount of load is measured by a strain gauge that is disposed on the outer surface of the drum. The load data is transferred to the auxiliary control unit inside the baffle.
- [0010] In another embodiment of the present invention, the digital signals generated in the auxiliary control unit are transferred to the main control unit by means of a brush positioned to contact the drum and the cables.
- [0011] In another embodiment of the present invention, the metal screw providing the mounting of the baffle is also used in data transfer from the auxiliary control unit to the main control unit.
- [0012] In another embodiment of the present invention, the data transfer from the auxiliary control unit to the main control unit is provided by wireless transfer methods like RFID.
- [0013] In another embodiment of the present invention, the auxiliary control unit is energized by a power source situated inside the baffle.
- [0014] In another embodiment of the present invention, the energy of the auxiliary control unit is supplied from the main control unit by means of the brush and cables.

- [0015] In the laundry washing/drying machine of present invention, the data relating to the laundry inside the drum is detected by the sensors disposed on or in the vicinity of the drum baffle and the data received from the sensors is transferred to the auxiliary control unit inside the drum baffle. The lengths of the cables between the sensors and the auxiliary control unit are decreased, thus data transfer is prevented from being affected by the cable resistance or the electromagnetic noise in the environment. Safety is provided in data transfer and data losses are prevented.
- [0016] The laundry washing/drying machine realized in order to attain the aim of the present invention is illustrated in the attached figures, where:
- [0017] Figure 1 - is the schematic view of a laundry washing/drying machine.
- [0018] Figure 2 - is the schematic view of a laundry washing/drying machine in another embodiment of the present invention.
- [0019] Figure 3 - is the schematic view of a portion of the drum and a drum baffle.
- [0020] The elements illustrated in the figures are numbered as follows:
1. Laundry washing/drying machine
 2. Drum
 3. Baffle
 4. Sensor
 5. Main control unit
 6. Auxiliary control unit
 7. First electrode
 8. Second electrode
 9. Brush
 10. Screw
 11. Conductive strip
 12. Non-conductive strip
 13. Power source
- [0021] The laundry washing/drying machine (1) comprises a drum (2) wherein the laundry is placed, one or more than one baffle (3) mounted on the circular inner surface of the drum (2) that provides the tumbling of the laundry, one or more than one sensor (4, 104, 204) disposed in the drum (2) that provides the detection of parameters relating to the laundry like humidity,

temperature, laundry amount (load) and type of laundry, and a main control unit (5) that regulates the washing/drying operations.

[0022] The laundry washing/drying machine (1) of the present invention comprises an auxiliary control unit (6) disposed inside the baffle (3), that converts the analog signals received from the sensor (4, 104, 204) to digital signals and transfers the digital signals to the main control unit (5).

[0023] In the laundry washing/drying machine (1), the transfer of analog signals from the sensors (4, 104, 204) to the auxiliary control unit (6) is provided by the analog signal transfer cables (will be referred as the cable (K1) shortly) connected to the auxiliary control unit (6) by extending into the interior of the baffle (3).

[0024] The analog data received continuously from the sensors (4, 104, 204) is transferred to the auxiliary control unit (6) by means of the cables (K1), the auxiliary control unit (6) processes and converts the analog data into digital data limited by numbers (1,0) and transfers the digital data to the main control unit (5). The auxiliary control unit (6) is situated at the nearest position to the laundry and the sensors (4, 104, 204) inside the drum (2) by being mounted into the baffle (3). The length of the cables (K1) extending between the sensors (4, 104, 204) and the auxiliary control unit (6) is minimized, the cable (K1) resistance decreases and data loss is prevented. Data transfer is realized without interruption and is not affected from the electromagnetic noise originating from the mains or other electrical devices in the outside environment. The baffle (3) serves as a protector that prevents the auxiliary control unit (6) from being affected from the effects of water or the humid environment inside the drum (2).

[0025] In an embodiment of the present invention, the sensors (4, 104, 204) are disposed on the baffle (3) and/or on the body of the drum (2) in the vicinity of the baffle (3).

[0026] In another embodiment of the present invention, the laundry washing/drying machine (1) comprises a temperature sensor (4) disposed on the surface of the baffle (3) facing the interior of the drum (2).

[0027] The temperature sensor (4) disposed on the baffle (3) detects the temperature by directly contacting the laundry and advantage is provided

over methods wherein the temperature data of the laundry is obtained indirectly by remote temperature measurements. The data detected by the temperature sensor (4) is transferred to the auxiliary control unit (6) inside the baffle (3) whereon the temperature sensor (4) is located by means of the cables (K1) and is transferred to the main control unit (5) as digital signals by being processed in the auxiliary control unit (6).

- [0028] In another embodiment of the present invention, the laundry washing/drying machine (1) comprises a humidity sensor (104) that detects the degree of dryness by measuring electrical conductivity of the laundry, having a first electrode (7) situated on the surface of the baffle (3) facing the interior of the drum (2) and a second electrode (8) disposed in the vicinity of the baffle (3) on the inner surface of the drum (2).
- [0029] In another embodiment of the present invention, in the laundry washing/drying machine (1), the baffle (3) functions as the first electrode (7) and the body of the drum (2) functions as the second electrode (8).
- [0030] The data detected by the humidity sensor (104) is transferred to the auxiliary control unit (6) inside the baffle (3) whereon the first electrode (7) is located by means of the cables (K1) and is transferred to the main control unit (5) as digital signals by being processed in the auxiliary control unit (6).
- [0031] In another embodiment of the present invention, the laundry washing/drying machine (1) comprises a load sensor (204) disposed on the outer surface of the drum (2), having a strain gauge that provides the determination of the amount of load in the drum (2) by measuring the elongations occurring on the body of the drum (2) with the effect of laundry weight.
- [0032] The data detected by the load sensor (204) is transferred to the auxiliary control unit (6) inside the baffle (3) by means of the cables (K1) extending from the outside of the drum (2) and is transferred to the main control unit (5) as digital signals by being processed in the auxiliary control unit (6).
- [0033] In an embodiment of the present invention, data transfer between the auxiliary control unit (6) and the main control unit (5) is provided by means of digital signal transfer cables (will be referred as the cable (K2) shortly).

- [0034] The data transferred from the cables (K2) extending between the auxiliary control unit (6) and the main control unit (5) is in digital format and the cables (K2) cannot possibly be affected by the cable (K2) resistance and the external electromagnetic noise. Long cables (K2) can be used between the auxiliary control unit (6) and the main control unit (5).
- [0035] In an embodiment of the present invention, the laundry washing/drying machine (1) comprises a brush (9) composed of copper or steel wires and positioned outside the drum (2) so as to remain fixed thereon while the drum (2) rotates, providing the transfer of the digital signals generated in the auxiliary control unit (6) to the main control unit (5) by means of the cables (K2). In this embodiment, the signals generated in the auxiliary control unit (6) are transferred to the main control unit (5) by means of the brush (9) and the cables (K2).
- [0036] In another embodiment of the present invention, the laundry washing/drying machine (1) comprises a screw (10) which provides the baffle (3) to be mounted to the drum (2), produced from conductive material, the end of which extends into the baffle (3), connected to the auxiliary control unit (6) with the cables (K1) with the brush (9) contacting its head portion that is seated on the outer surface of the drum (2).
- [0037] The screw (10) completes the conduction path between the auxiliary control unit (6) and the main control unit (5) for the transfer of signals. The screw (10) furthermore is used in securing the baffle (3) to the drum (2) and thereby an additional fastening element is not required. The signals generated in the auxiliary control unit (6) are transferred to the screw (10) by means of the cables (K1) and are transferred from the auxiliary control unit (6) to the main control unit (5) by means of the brush (9) and the cables (K2).
- [0038] In another embodiment of the present invention, the laundry washing/drying machine (1) comprises a conductive strip (11) disposed between the screw (10) head and outer surface of the drum (2), that receives the signals transferred outside the drum (2) by means of the screw (10) with the brush (9) contacting thereon.
- [0039] In another embodiment of the present invention, the conductive strip (11)

is wrapped all around the drum (2) and secured to the drum (2) by the screw (10). The brush (9) contacts the conductive strip (11) during the rotation of the drum (2) and continuity is provided in data transfer.

- [0040] In another embodiment of the present invention, the laundry washing/drying machine (1) comprises a non-conductive strip (12) disposed between the conductive strip (11) and the drum (2). The non-conductive strip (12) provides the safe transfer of signals to the conductive strip (11) and prevents the signals from getting lost by dispersing in the body of the drum (2).
- [0041] In another embodiment of the present invention, the signals generated in the auxiliary control unit (6) are transferred to the main control unit (6) by means of a wireless transfer means (not shown in the figures), for example like RFID.
- [0042] In another embodiment of the present invention, the laundry washing/drying machine (1) comprises a power source (13) like battery or super capacitor, disposed on the inner surface of the baffle (3) or on the auxiliary control unit (6), which energizes the auxiliary control unit (6). The low amount of energy required for functioning of the components like the microprocessor in the auxiliary control unit (6) is supplied by means of the power source (13).
- [0043] In another embodiment of the present invention, the energy required for functioning of the auxiliary control unit (6) is supplied from the main control unit (5) by means of the cables (K2) and the brush (9).
- [0044] In the laundry washing/drying machine (1) of the present invention, the data relating to the laundry inside the drum (2) like humidity, temperature, amount of load are detected by the sensors (4, 104, 204) disposed on the baffle (3) and/or in the vicinity of the baffle (3) in close position to the laundry and is transferred to the auxiliary control unit (6) inside the baffle (3) to be converted into digital signals by being processed. The distance between the sensors (4, 104, 204) and the auxiliary control unit (6) is minimized and the signals are prevented from being affected by the electromagnetic noise in the environment. Safety is provided in data transfer and data losses are prevented. The parameters relating to the

laundry are measured precisely from points close to the laundry, the errors are detected quickly and the washing/drying performance is improved.

[0045] It is to be understood that the present invention is not limited by the embodiments disclosed above and a person skilled in the art can easily introduce different embodiments. These should be considered within the scope of the protection disclosed by the claims of the present invention.

Claims

1. A laundry washing/drying machine (1) comprising a drum (2) wherein the laundry is placed, one or more than one baffle (3) mounted on the inner surface of the drum (2), one or more than one sensor (4, 104, 204) disposed in the drum (2) and a main control unit (5) that regulates washing/drying operations, **characterized in that** an auxiliary control unit (6) disposed inside the baffle (3) that converts the analog signals received from the sensor (4, 104, 204) to digital signals and transfers the digital signals to the main control unit (5).
2. A laundry washing/drying machine (1) as in Claim 1, **characterized in that** cables (K1) connected to the auxiliary control unit (6) by extending from the sensors (4, 104, 204) to the interior section of the baffle (3) and which transfer analog signals.
3. A laundry washing/drying machine (1) as in Claim 1 or 2, **characterized in that** the sensors (4, 104, 204) that are disposed on the baffle (3) and/or in the vicinity of the baffle (3) on the body of the drum (2).
4. A laundry washing/drying machine (1) as in any one of the above Claims, **characterized in that** a temperature sensor (4) disposed on the surface of the baffle (3) facing the interior of the drum (2).
5. A laundry washing/drying machine (1) as in any one of the above Claims, **characterized in that** a humidity sensor (104) having a first electrode (7) placed on the surface of the baffle (3) facing the interior of the drum (2) and a second electrode (8) placed in the vicinity of the baffle (3) on the inner surface of the drum (2).
6. A laundry washing/drying machine (1) as in Claim 5, **characterized in that** the baffle (3) functioning as the first electrode (7) and the drum (2) functioning as the second electrode (8).
7. A laundry washing/drying machine (1) as in any one of the above Claims, **characterized in that** a load sensor (204) disposed on the outer surface of the drum (2), having a strain gauge that provides the determination of the amount of load in the drum (2) by measuring the elongations occurring on the body of the drum (2) with the effect of laundry weight.
8. A laundry washing/drying machine (1) as in any one of the above Claims,

characterized in that cables (K2) that provide digital signal transfer between the auxiliary control unit (6) and the main control unit (5).

9. A laundry washing/drying machine (1) as in Claim 8, **characterized in that** a brush (9) positioned outside the drum (2), providing the transfer of the digital signals generated in the auxiliary control unit (6) to the main control unit (5) by means of the cables (K2).
10. A laundry washing/drying machine (1) as in Claim 9, **characterized in that** a screw (10) which provides the baffle (3) to be mounted to the drum (2), produced from conductive material, the end of which extends into the baffle (3), connected to the auxiliary control unit (6) with the cables (K1), and whereon the brush (9) contacts.
11. A laundry washing/drying machine (1) as in Claim 9 or 10, **characterized in that** a conductive strip (11) disposed between the screw (10) head and the outer surface of the drum (2) and a non-conductive strip (12) disposed between the conductive strip (11) and the drum (2).
12. A laundry washing/drying machine (1) as in any one of the Claims 1 to 7, **characterized in that** a wireless transfer means that provides the transfer of the signals generated in the auxiliary control unit (6) to the main control unit (5).
13. A laundry washing/drying machine (1) as in any of the above Claims, **characterized in that** a power source (13), disposed on the inner surface of the baffle (3) or on the auxiliary control unit (6) and which energizes the auxiliary control unit (6).
14. A laundry washing/drying machine (1) as in any one of the Claims 1 to 12, **characterized in that** the auxiliary control unit (6) which receives energy from the main control unit (5) by means of the cables (K2) and the brush (9).

Figure 1

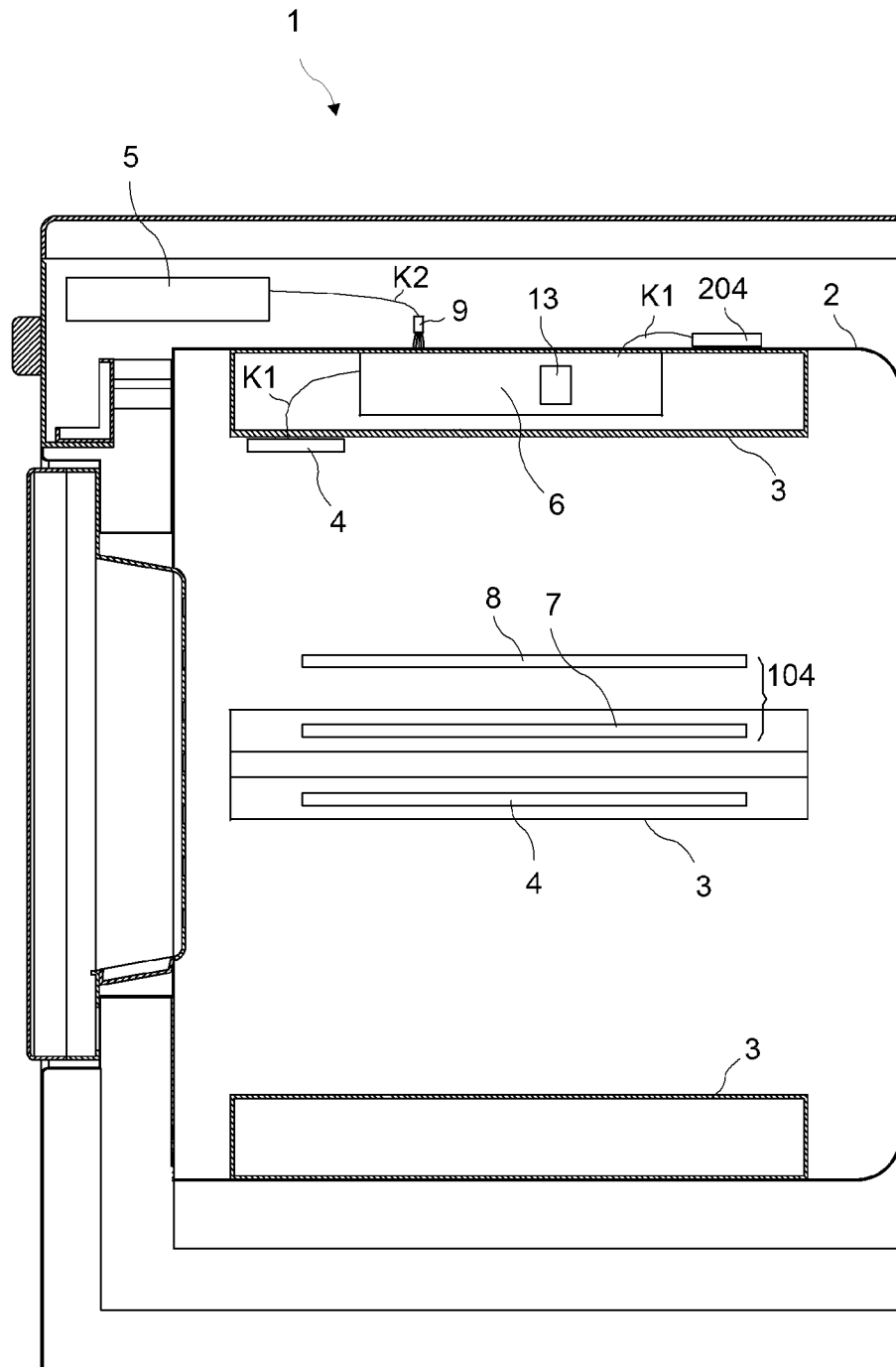


Figure 2

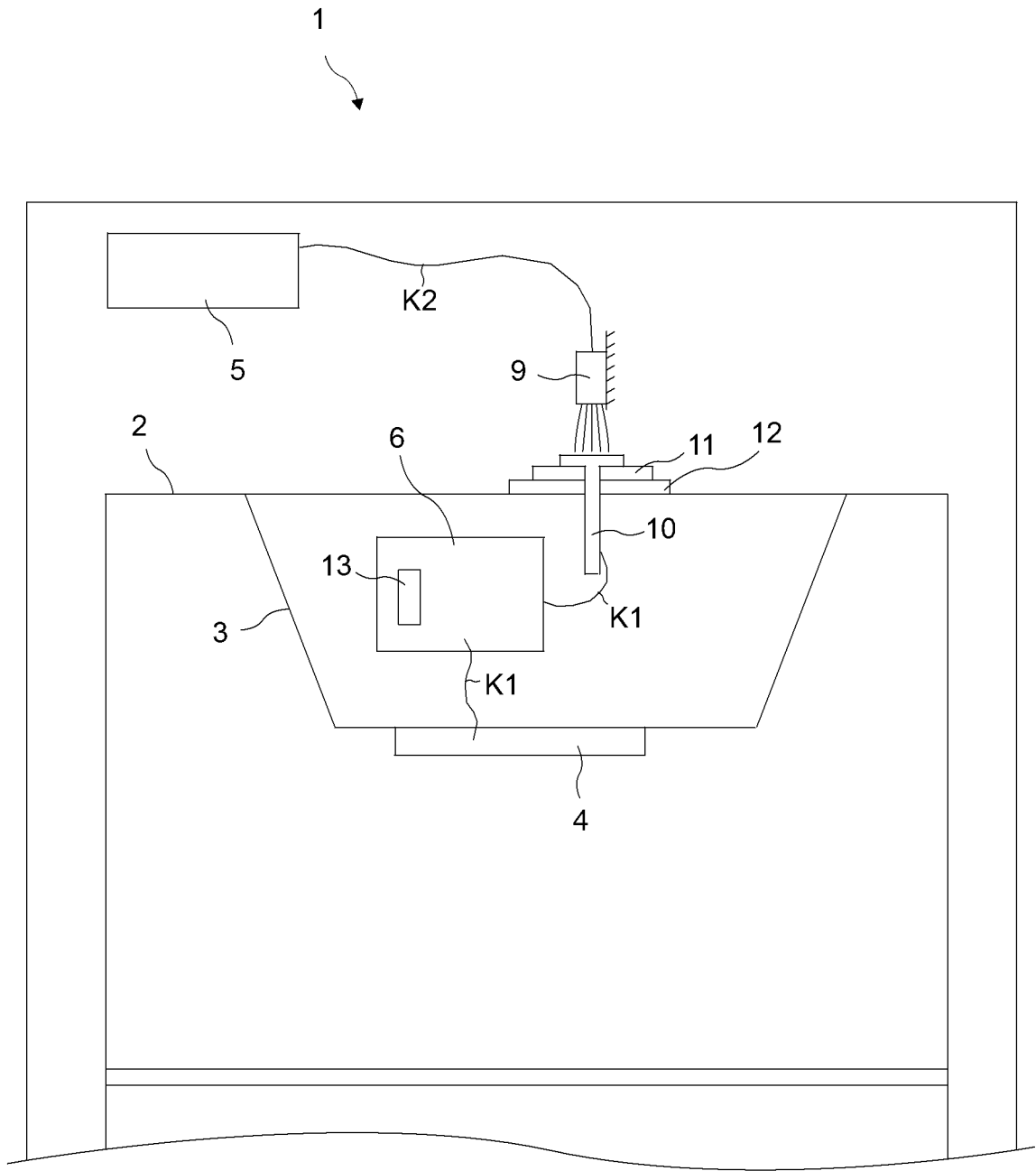
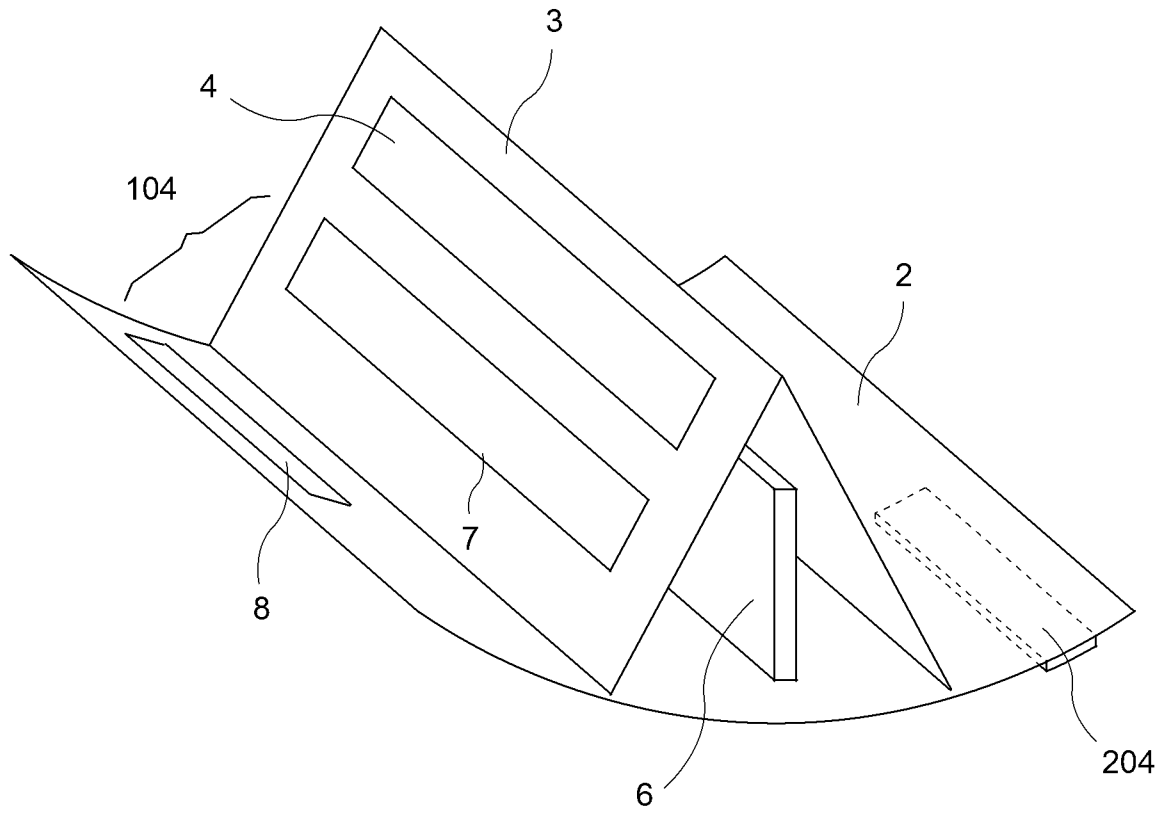


Figure 3



INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2013/060284

A. CLASSIFICATION OF SUBJECT MATTER

INV. D06F58/28 D06F37/06 D06F37/14 D06F25/00
 ADD. D06F33/02

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

D06F

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)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2004/022836 A2 (E G O CONTROL SYSTEMS GMBH & C [DE]; BAYER EWALD [DE]) 18 March 2004 (2004-03-18)	1-6,8,9, 12,13
Y	page 1, line 7 - page 10, line 11; claims;	14
A	figures	7,10,11
X	EP 1 148 169 A2 (ELECTROLUX ZANUSSI ELETTRODOME [IT]) 24 October 2001 (2001-10-24)	1-3,8,9, 12,13
A	paragraphs [0001] - [0005], [0012] - [0022]; claims; figures	4-7,10, 11,14
X	EP 0 549 467 A1 (SEXTANT AVIONIQUE [FR] CROUZET APPLIANCE CONTROLS [FR]) 30 June 1993 (1993-06-30)	1-3,8, 12,13
A	column 1, lines 1-11; column 3, line 18 - column 4, line 44; claims; figures	4-7, 9-11,14
	----- -/-	



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

3 September 2013

Date of mailing of the international search report

12/09/2013

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel. (+31-70) 340-2040,
 Fax: (+31-70) 340-3016

Authorized officer

Clivio, Eugenio

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2013/060284

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	KR 2004 0049186 A (LG ELECTRONICS INC) 11 June 2004 (2004-06-11)	14
A	claims; figures -----	1-13
A	FR 1 564 923 A (MM. RENÉ VIGUIER ET PATRICE BACLE) 25 April 1969 (1969-04-25) the whole document -----	1-14

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2013/060284

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2004022836 A2	18-03-2004	AU 2003283236 A1 DE 10242144 A1 WO 2004022836 A2	29-03-2004 18-03-2004 18-03-2004
EP 1148169 A2	24-10-2001	EP 1148169 A2 IT PN20000023 A1	24-10-2001 18-10-2001
EP 0549467 A1	30-06-1993	DE 69225391 D1 EP 0549467 A1 FR 2685359 A1	10-06-1998 30-06-1993 25-06-1993
KR 20040049186 A	11-06-2004	NONE	
FR 1564923 A	25-04-1969	NONE	