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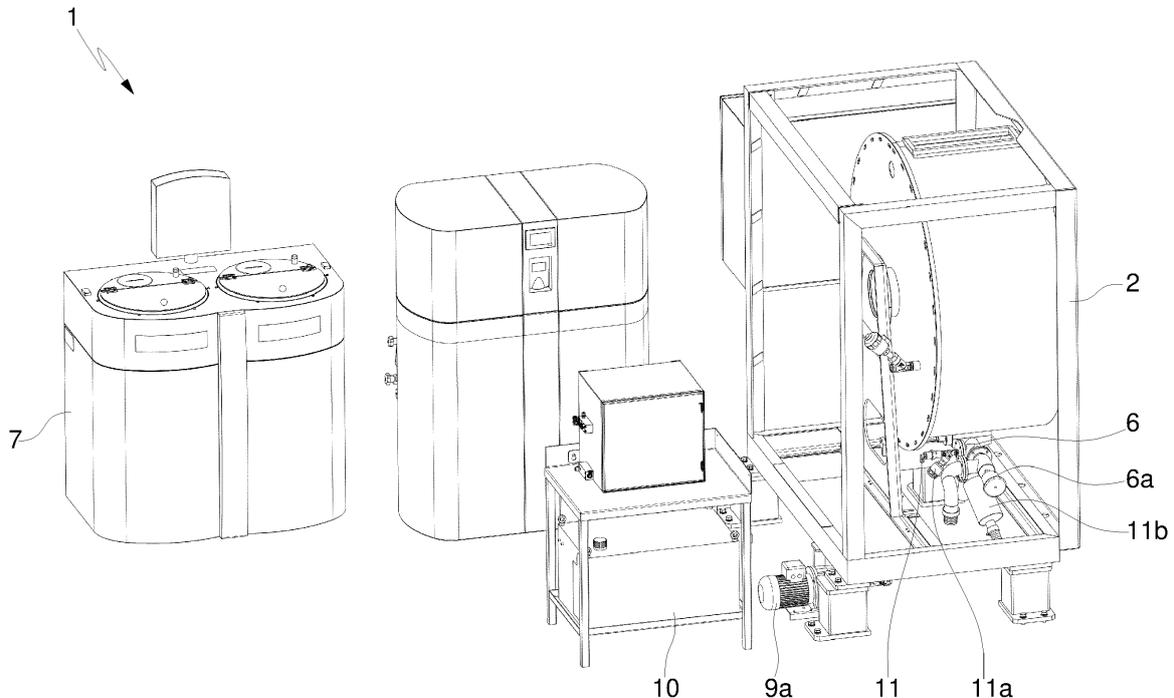
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(54) **APPARATUS FOR DECOLORING OR TREATING MANUFACTURED ARTICLES, SUCH AS FOR EXAMPLE ITEMS OF CLOTHING**

(57) The present invention relates to an apparatus and a method of decoloring or treating manufactured articles, such as items of clothing.



**FIG. 1**

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## Description

### TECHNICAL FIELD OF THE INVENTION

**[0001]** The present invention relates to an apparatus for decoloring or treating manufactured articles, such as, for example, items of clothing as well as a method for the treatment of manufactured articles.

### STATE OF THE PRIOR ART

**[0002]** To date, many apparatus for decoloring items of clothing have been proposed.

**[0003]** These apparatuses, with the aim of decoloring the items, usually use water plus specific substances, which are fed into a housing area where a basket for containing the items is mounted for rotation.

**[0004]** Such apparatuses are not usually suitable for ensuring an effective decolorization in combination with energy savings and without the need to use chemicals deemed as dangerous and/or harmful.

**[0005]** DE102011089386A1, EP1518955A1 and US5313811A teach solutions according to the prior art.

### OBJECTS OF THE INVENTION

**[0006]** An object of the present invention is to provide a new apparatus for decoloring or treating manufactured articles, such as for example items of clothing.

**[0007]** Another object of the present invention is to provide an apparatus capable of obtaining a bleaching or decoloring effect better than the solutions proposed so far, thereby creating opposing effects with original characteristics, in line with the principles usually dictated by fashion.

**[0008]** Another object of the present invention is to provide an apparatus for decoloring or treating manufactured articles that is able to carry out an effective treatment of items of clothing without the need to use aggressive chemicals.

**[0009]** Another object of the present invention is to provide an apparatus for decoloring or treating manufactured articles that is suitable for ensuring a reduced consumption of water, if desired working at room temperature.

**[0010]** According to an aspect of the invention, an apparatus according to claim 1 is provided.

**[0011]** The dependent claims refer to preferred and advantageous embodiments of the invention.

### BRIEF DESCRIPTION OF THE DRAWINGS

**[0012]** Other features and advantages of the invention will be more evident from the description of an embodiment of an apparatus, illustrated by way of example in the accompanying drawings in which:

- figure 1 is a perspective view with parts removed of

- an apparatus according to the present invention;
- figure 2 is a front view with parts in transparency of components of the apparatus of figure 1;
- figure 3 is a rear view with parts in transparency of components of the apparatus of figure 1,
- figure 4 is a schematic view of an apparatus according to the present invention.

**[0013]** In the accompanying drawings identical parts or components are indicated by the same reference numbers.

### EMBODIMENTS OF THE INVENTION

**[0014]** With reference to the enclosed figures, an apparatus or washing machine 1 for decoloring or treating manufactured articles, such as, for example items of clothing, as pants, t-shirts, sweaters, jackets, etcetera, has been shown, which comprises a main frame 2 delimiting a basin and a basket 3 defining a positioning area 4 of the items and rotatably mounted within the frame 2 or rather within the basin.

**[0015]** As for the treatment of manufactured articles can be understood, for example, decolorizing, bleaching or cleaning manufactured articles, such as, for example, items of clothing. In this regard, the apparatus according to the present invention is capable of generating homogeneous or opposing effects on finished items of clothing, fabrics or accessories, this being obtained in particular by modifying the amount of ozone, and thus preventing the items from graying owing to the latter, thereby enhancing their originality and aesthetics.

**[0016]** The apparatus 2 is then provided with a door 5 pivoted or constrained to the frame 2 and movable so as to open or close (of course with fluid, such as liquid and/or gas tight), an access opening AA to the positioning area 4, which access area AA is delimited by the frame 2, particularly at a front position thereof.

**[0017]** Clearly, the apparatus is also equipped with motorization means, such as an electric motor (not shown in the drawings) designed to drive the basket 3 in rotation around a rotation axis, if desired horizontal, for example in direction from the rear to the front (defined by door) of the apparatus 1.

**[0018]** The apparatus has also one or more ducts 6 for discharging fluids from the positioning area 4 as well as an electronic control unit or PLC.

**[0019]** The apparatus 1 then comprises at least one tank 7 containing or arranged to contain at least one first compound, preferably a liquid compound, such as at least one chemical, natural product and/or water, for example a composition of water and enzymes, such as cellulase or  $\alpha$  amylase, or anyway mixtures arranged to wash or dye manufactured articles, such as items of clothing.

**[0020]** According to the non-limiting embodiment illustrated in the figures, two tanks 7 are provided, for example rigidly connected to one another. At least one conveying

duct 9 of the first compound from the tank 7 or from each tank 7 towards and into the positioning area 4 is then included in the apparatus.

**[0021]** The first compound can comprise a component or even more components. In this regard, the tanks 7 could also be filled with different components to be mixed before or after feeding in the positioning area 4.

**[0022]** The enzymes, if provided, are designed to create an abrasion and/or bio-cleaning effect on the fabric of items of clothing. The enzymes can be used, for example, in a quantity up to 2/3% with respect to the weight (kg) of the manufactured or items to be treated. The enzymes that can be used, preferably, operate at cold, and thus at room temperature.

**[0023]** The apparatus then comprises means of nebulizing or means of dispensing of the first compound in the positioning area 4 in the form of falling drops or microbubbles or nanobubbles.

**[0024]** In this respect, preferably, the apparatus 1 is equipped with at least one container or generator 8 of compressed gas, for example compressed air. Clearly, a generator of gas compressed can consist of a compressor.

**[0025]** To this regard, the compressed gas is supplied by the container or generator 8 in a passage duct 8a, which opens or is in fluid communication with the tank 7 or with the conveying duct 9 or with the positioning area 4, if desired at one or more nozzles 12, which will be described later or at the discharge or outlet end in the positioning area 4 of the conveying duct 9, so as to determine the dispensing or nebulization of the first compound contained or coming from the tank 7 and the transmission or dispensing of such nebulized compound within the positioning area 4.

**[0026]** If desired, the nebulization and dispensing of the first nebulized compound is carried out for a time between 5' and 30' for each washing cycle.

**[0027]** Of course, nebulization could also be obtained without compressed gas, for example by pressurizing the first compound or by means of a pressurized liquid (such as water).

**[0028]** With reference to this aspect, according to an embodiment, the first compound is pushed into the conveying duct 9 by means of a pump 9a (suitably operated), for example a membrane pump, which, if desired, is fed with air, while the compressed gas, for example compressed air for example at 4-8 bar, if desired 6 bar, is conveyed by means of a respective duct 8a up to one or more nozzles 12, whereas the fluid is conveyed through the conveying duct 9 up to these nozzles, so that the compressed gas entering the nozzles 12 determines the nebulization of the first compound. Of course, if more nozzles 12 are provided, first terminal branches 8b of the duct 8a each to serve a respective nozzle 12, and second end branches 9b of the conveying duct 9 each designed to serve a respective nozzle 12 will preferably be provided. Alternatively, a plurality of ducts 8a and 9 could be foreseen.

**[0029]** Clearly, as an alternative of the illustrated embodiment, a suitable fitting or chamber could also be provided with a first suction mouth in fluid communication with or served by the tank or conveying duct 9, at least a second suction mouth in fluid communication with or served by the container or generator 8 of a compressed gas or by the passage duct 8a and at least one mouth for the outflow of the first nebulized compound (by means of the compressed gas). Of course, in this case the outflow mouth could open into a duct for transporting the nebulized first compound (if desired mixed with ozone) to the positioning area 4.

**[0030]** The apparatus 1 is then equipped with at least one ozone generator or vessel 10 and at least one ozone transmitting tube 11 from the generator 10 to the positioning area 4 or to the tank 7.

**[0031]** If desired, according to the non-limiting embodiment illustrated in the figures, the transmitting tube 11 opens into the discharge duct 6 or into a discharge opening where this duct is mounted and/or in a lower area of the tank and/or on pipes leading to the lower area of the apparatus.

**[0032]** With reference to this aspect, the exhaust duct 6 is intercepted by the transmitting tube 11, if desired with the interposition of a special shut-off valve 11a.

**[0033]** Downstream of the interception area by the transmitting pipe 11, a storage well 11b can be provided for the operation of a special drain pump.

**[0034]** Moreover, an opening/closing valve 6a of the exhaust duct 6 may be provided.

**[0035]** Clearly, when the ozone is to be supplied, the valve 6a is closed and the exhaust system is not active.

**[0036]** Of course, the ozone can be introduced into the positioning area 4 in the submerged part in the first compound, in the part with air or steam (top) and/or in the present service pipes.

**[0037]** Furthermore, the control unit is arranged to operate at different times or substantially simultaneously the dispensing of the first compound and of the ozone within the positioning area 4. If this dispensing occurs at different times, then, preferably, first the first nebulized compound is dispensed so as to wet or affect the manufactured articles and then the ozone is delivered on the items treated with the first nebulized compound.

**[0038]** In this regard, it is therefore possible, according to a first variant, first to feed the first compound in the positioning area 4 and then, after a given period of nebulization of the manufactured articles, to feed ozone, or to feed them substantially simultaneously.

**[0039]** Alternatively, the transmitting tube 11 can open into the tank 7 or into the conveying duct 9, so that the ozone is mixed with the first compound and subsequently the thus obtained mixture is nebulized and conveyed within the positioning area 4.

**[0040]** If desired, the apparatus 1 comprises at least one nozzle 12 supported by the frame 2 or by the door 5, which is arranged to dispense the first compound nebulized or in the form of droplets or microbubbles or na-

nobubbles in the positioning area 4, the nozzle/s 12 being then in fluid communication or served by the conveying duct 9 and, if provided, by the passage duct 8a or rather by the transport duct for the nebulized mixture and opens/open in the positioning area.

**[0041]** In this regard, according to the embodiment shown in the figures, a nozzle or more nozzles are provided, for example two, three, four, five, six or more nozzles 12 supported by the door 5.

**[0042]** With reference to such an aspect, the door 5 can be provided with a porthole 5a for inspection of the positioning area 4 and one or more nozzles 12 can, for example, but not necessarily, be mounted or supported by the porthole 5a. The porthole 5a can be provided in an upper area of the door 5.

**[0043]** Preferably, the nozzles 12 have the main body mounted outside the positioning area 4 and the dispensing opening protruding within the positioning area 4, which opening is advantageously facing downwards or towards one side of the apparatus 1.

**[0044]** Moreover, the apparatus may also include a container 14 of an ozone decomposition (in oxygen) substance in the first compound and in the manufactured articles, if desired for neutralizing ozone in water and in the items of clothing, as well as a destructive component 15 of the volatile or gaseous ozone present in the positioning area 4. To this regard, as it is known the ozone is harmful for the environment and must be destroyed.

**[0045]** The destructive component 15 is essentially designed to decompose the ozone so as to generate oxygen.

**[0046]** With respect to this aspect, the decomposition substance may comprise a compound selected from the group consisting of, for example, sodium metabisulphite, hydroxylamine, oxalic acid and hydrogen peroxide or other suitable chemical compounds. The decomposition substance can be introduced into the positioning area 4 and then into the first compound and into the items of clothing therein automatically, through a respective duct, or even manually starting from a specific opening.

**[0047]** If desired, the decomposition substance is introduced in an amount of from 1 to 20 g per liter of first compound, if desired, water.

**[0048]** The volatile or gaseous ozone present in the positioning area 4, but not on the manufactured articles or mixed in the first compound, comes out from one or more special chimneys of the apparatus and it is thus sent to the destructive component 15 which provides for the appropriate treatment or decomposition of the ozone or rather the catalytic destruction of ozone.

**[0049]** The apparatus 1 can also include hot and/or cold water inlet ducts, but also so-called "hard" or "softened" water or a variant thereof to the positioning area 4, which ducts are in communication with the traditional water supply network.

**[0050]** With an apparatus according to the present invention, it is possible to carry out a method for decolourizing or treating manufactured articles, such as, for ex-

ample items of clothing, which method comprising the following steps:

- placing manufactured articles such as for example items of clothing in the positioning area 4 and closing the door 5,
- feeding the first compound, is desired nebulized by means of the compressed gas, in the positioning area 4,
- before, during or after dispensing the first compound, if desired nebulized or in the form of falling droplets, microbubbles or nanobubbles, feeding ozone through the transmission tube 11 in the positioning area 4 or feeding ozone in the tank 7 or in the conveying duct 9 for mixing the ozone with the first compound.

**[0051]** A method according to the present invention and including the steps here described is advantageously, but not necessarily implemented by means of an apparatus as described above.

**[0052]** If desired, but not necessarily, before, during or after dispensing the first nebulized compound and before, during or after feeding the ozone, the basket 3 is rotated, for example at a speed between 5 and 50 RPM for a time between 5' and 120', and keeping it into rotation for a determined period after delivery and feeding. In this regard, the first nebulized compound and the ozone could be delivered or fed into the positioning area and subsequently they act on the manufactured articles even when the basket is stationary or subjected to small movements/rotations.

**[0053]** The feeding of the first nebulized compound in the positioning area, according to the above, can be carried out in the following ways:

- feeding the first compound by means of a pump in the conveying duct 9 up to the positioning area 4, if desired in the nozzles 12 and conveying the compressed gas through one or more respective ducts 8a up to the positioning area 4, if desired in the nozzles 12; or
- feeding the first compound and the compressed gas into a suitable fitting or chamber with a first suction mouth in fluid communication with or served by the tank or by the conveying duct 9, at least a second suction mouth in fluid communication with or served from the container or generator 8 of a compressed gas or from the passage duct 8a and at least one mouth for the outflow of the first nebulized compound opening into a duct for transporting the nebulized first compound (if desired mixed with ozone) to the positioning area 4.

**[0054]** The treated manufactured articles or items of clothing are then extracted from the positioning area 4. If desired, it is also possible to provide a drying step for the manufactured articles or items of clothing in the po-

sitioning area 4.

**[0055]** A method according to the present invention can also be carried out in several apparatuses and therefore not necessarily in one apparatus as indicated above. Such apparatuses should clearly not comprise all the components described above, but they could also comprise for example only the delivery system of the first compound, or only the ozone delivery system or only the rotating basket or two or more of these components.

**[0056]** To this regard, such method for decoloring or treating manufactured articles, such as for example items of clothing could be carried out with at least two apparatuses, each comprising a main frame 2, a basket 3 defining a positioning area 4 of the items mounted within the frame 2, a door 5 pivoted or constrained to the main frame 2 and movable so as to open or close an access opening AA to the positioning area 4.

**[0057]** Clearly, one or more of such apparatuses could be as above described.

**[0058]** Such method could then include the following steps:

- placing, manually or automatically, manufactured articles such as for example items of clothing in the positioning area 4 of a first apparatus and closing the respective door 5,
- feeding a first compound in the positioning area 4 of the first apparatus so as to wet the manufactured articles with the first compound,
- taking, manually or automatically, the wet manufactured articles from then first apparatus and placing them in the positioning area of a second apparatus, first, during or after such positioning, feeding ozone through a respective transmission tube 11 into the positioning area 4 of the second apparatus.

**[0059]** Moreover, preferably:

- before, during or after feeding the ozone, one could rotate the basket 3 in the second apparatus and keep it rotating for a certain period, or
- taking, manually or automatically, from the second apparatus the wet and ozone-treated manufactured articles, placing them in the positioning area 4 of a third apparatus and rotating the basket 3 in the third apparatus and keeping it rotating for a certain period.

**[0060]** Regarding this, in order to extract the items treated with ozone, and to insert them in the second apparatus, it would first be necessary to reduce the ozone by destroying the part present in the air and that present in the water/enzymatic solution and on the items, otherwise the operation would be dangerous/harmful to the operator.

**[0061]** If desired, the first compound is dispensed in an amount between 0.1 and 3 litres for each kg of products and/or items of clothing placed in the positioning area 4.

**[0062]** Moreover, the absorption ratio or the bath ratio, i.e. the ratio between the weight of the items of clothing and the volume of the first compound, such as water in the positioning area, ranges preferably between 1:0.1 and 1:3.

**[0063]** Preferably, the first compound is kept at room temperature. In general, the temperature in the positioning area during the method is the room temperature.

**[0064]** The compressed gas, if provided, can instead be fed at a pressure between 0.5 and 8 bar.

**[0065]** If the ozone is fed on the items wet by the first compound, this step can be carried out for example for a time between 5' and 120', depending on the desired effect. The amount over time, for example in hours of injected ozone depends on the amount of manufactured articles or items introduced and on the type of ozone generator and on the model of washing machine/apparatus used.

**[0066]** The values indicated above naturally refer to a treatment cycle.

**[0067]** If a container 14 of a decomposition substance and a destructor component 15 are provided, then the method, after the other indicated steps, but before the extraction of the manufactured articles, involves the insertion in the positioning area 4 of the substance of decomposition of the ozone in the first compound and in the manufactured articles and a step of destruction of the volatile or gaseous ozone (fed to the chimney (s)) by means of the destructor component 15.

**[0068]** If desired, the first compound, before being sent to the positioning area, by checking the appropriate electrovalves, is sent to the machine drain and then subsequently to the washing machine. This step is clearly optional and not essential.

**[0069]** In any case, if the same is foreseen, it is carried out for two main reasons:

- promote the cleaning of the ducts that run from the tank to the nozzles, since if a different product was previously used, it is advisable to clean the ducts before nebulizing the new product in the apparatus;
- to be able to nebulize the first compound immediately, otherwise there would be the possibility that an air gap occurs in the ducts before the first compound reaches the positioning area, or, if provided, the nozzles.

**[0070]** Clearly, the control of the electronic valves, the rotation of the basket and the automatic operation of the apparatus is entrusted to the control unit.

**[0071]** Moreover, the control unit or PLC could be set up so as to be able to control the times, pressures and/or flow rates of the method.

**[0072]** If desired, the PLC could also make it possible to save the treatment configurations or "recipes", to then recall them during subsequent cycles.

**[0073]** Moreover, even if they are not described in general, special manual and/or automatic valves with control

means thereof are provided in the apparatus, as well as, where necessary, means of motorization of the components and appropriate sensors.

**[0074]** As it will be possible to ascertain, a method according to the present invention has the advantage of ensuring a better decolorization or bleach effect because it is superficial and less aggressive and accelerated than traditional methods and therefore allows:

- to obtain an exclusive aesthetic effect on the items, giving them a pleasant aesthetic,
- not to use aggressive chemicals,
- to reduce water consumption (since water is nebulized and sprayed, in smaller quantities than in an ozone process in water) and to work at room temperature. Furthermore, it ensures a natural shade to the items, with a contrasting effect at the seams.

**[0075]** Changes and variants of the invention are possible within the scope defined by the claims.

## Claims

1. Apparatus for decolourizing or treating manufactured articles, such as items of clothing comprising a main frame (2) delimiting a basin, a basket (3) defining a positioning area (4) of the clothes and rotatably mounted within said basin, a door (5) pivoted or constrained to said main frame (2) and movable so as to open or close an access opening (AA) to said positioning area (4), motorization means designed to drive said basket (3) in rotation around a rotation axis, at least one duct (6) for discharging fluids from said positioning area (4), an electronic control unit, wherein said apparatus comprises:

- at least one tank (7) containing or arranged to contain at least one first compound, such as at least one chemical, natural product and/or water,
  - at least one conveying duct (9) of said first compound from said tank (7) towards and into said positioning area (4),
  - at least one ozone generator or vessel (10), and
  - at least one ozone transmitting tube (11) from said ozone generator or vessel (10) to said positioning area (4) or to said at least one tank (7) or to said at least one conveying duct (9),
- said apparatus further comprising means of nebulizing or means of dispensing (12) of said first compound in said positioning area (4) in the form of falling or nebulized drops or microbubbles or nanobubbles.

2. Apparatus according to claim 1, wherein said at least one first compound comprises a composition of water and/or enzymes, such as cellulase or  $\alpha$  amylase.

3. Apparatus according to claim 1 or 2, comprising:

- at least one compressed gas container or generator (8),
  - at least one passage duct (8a) of the compressed gas fed by said at least one container or generator (8),
- said at least one passage duct (8a) opening or being in fluid communication with said at least one tank (7) or with said at least one conveying duct (9) or with said positioning area (4) so as to determine the dispensing of the first compound contained or coming from said at least one tank (7) within said positioning area (4).

4. Apparatus according to any of the preceding claims, wherein said electronic control unit is arranged to operate at different times or substantially simultaneously the dispensing of said first compound and of said ozone within said positioning area (4).

5. Apparatus according to any one of the preceding claims, wherein said at least one ozone transmission tube (11) opens into said discharge duct (6) or into a discharge opening wherein this discharge duct (6) or is mounted in a low zone of the basin or on pipes leading to the lower area of the apparatus.

6. Apparatus according to any one of claims 1 to 4, wherein said at least one transmission tube (11) opens into said at least one tank (7) or into said at least one conveying duct (9), so that the ozone is mixed with said at least one first compound and subsequently the thus obtained mixture is nebulized by means of said compressed gas and conveyed within said positioning area (4).

7. Apparatus according to any one of the preceding claims, comprising at least one nozzle (12) supported by said frame (2) or by said door (5) or by a port-hole provided in the door and arranged to dispense said at least one first nebulized compound in said positioning area (4), said at least one nozzle (12) being in fluid communication or served by said at least one conveying duct (9) or by a transport duct for said first nebulized compound.

8. Apparatus according to any one of the preceding claims, comprising a container (14) of an ozone decomposition substance in said first compound and in said manufactured articles in said basket (3), as well as a destructive component (15) of the volatile or gaseous ozone present in said positioning area (4) and in the basin.

9. Method for decolourizing or treating manufactured articles, such as, for example items of clothing, said method being carried out by an apparatus according

to any previous claims, said method comprising the following steps:

- placing manufactured articles such as items of clothing in a positioning area (4) of said decolourizing or treating apparatus for manufactured articles and closing a respective door (5),
  - feeding a first compound, such as at least one chemical, natural product, and/or water in said positioning area (4),
  - before, during or after dispensing said first compound, feeding ozone through said at least one transmission tube (11) in said positioning area (4) or feeding ozone in said at least one tank (7) for containing said first compound or in said at least one conveying duct (9) of said first compound from said at least one tank (7) to said positioning area (4) for mixing the ozone with the first compound,
- wherein said first compound is dispensed in said positioning area (4) nebulized or in the form of falling drops or microbubbles or nanobubbles.

**10.** Method according to claim 9, wherein before, during or after dispensing said first compound and before, during or after feeding said ozone, rotating a basket (3) defining said positioning area (4) and keeping it in rotation for a certain period after said dispensing and feeding.

**11.** Method for decolourizing or treating manufactured articles, such as, for example items of clothing with at least two apparatuses each comprising one main frame or basin (2), a basket (3) defining a positioning area (4) of the items mounted within said frame (2), a door (5) pivoted or constrained to said main frame (2) and movable such as to open or close an access opening (AA) to said positioning area (4), comprising the following steps:

- placing manufactured articles such as items of clothing in the positioning area (4) of a first apparatus and closing the respective door (5), said first apparatus being made according to any one of claims 1 to 8,
- feeding a first compound in said positioning area (4) of said first apparatus so as to wet said manufactured articles with said first compound, said first compound being dispensed in said positioning area (4) nebulized or in the form of falling drops or microbubbles or nanobubbles,
- taking said wet manufactured articles from said first apparatus and placing them in the positioning area of a second apparatus, first, during or after such positioning, feeding ozone through a respective transmission tube (11) into said positioning area (4) of said second apparatus.

**12.** Method according to claim 11, wherein

- before, during or after feeding said ozone, rotating said basket (3) in said second apparatus and keep it rotating for a certain period after said ozone feeding, or
- taking from said second apparatus said wet and ozone-treated manufactured articles, placing them in the positioning area (4) of a third apparatus and rotating the basket (3) in said third apparatus and keeping it rotating for a certain period.

**13.** Method according to any one of claims 9 to 12, wherein said first compound is dispensed in an amount between 0.1 and 3 litres for each kg of items of clothing in said positioning area (4).

**14.** Method according to any one of claims 9 to 13, wherein said ozone is fed onto the items wet from said first compound, if desired, nebulized for a time ranging from 5' to 120'.

**15.** Method according to any one of claims 9 to 14 with an apparatus according to claim 8, wherein after the other indicated steps a substance for the separation of ozone is introduced in said positioning area (4) in said first compound and in said manufactured articles and a destruction step is carried out by means of the destructive component (15) of the volatile or gaseous ozone in said positioning area (4) which is fed to at least one chimney of said at least one apparatus.

**16.** Method according to any one of claims 9 to 15 when dependent on claim 9 or 10, wherein said electronic control unit operates at different times or substantially simultaneously the dispensing of said first compound and of said ozone within said positioning area (4).

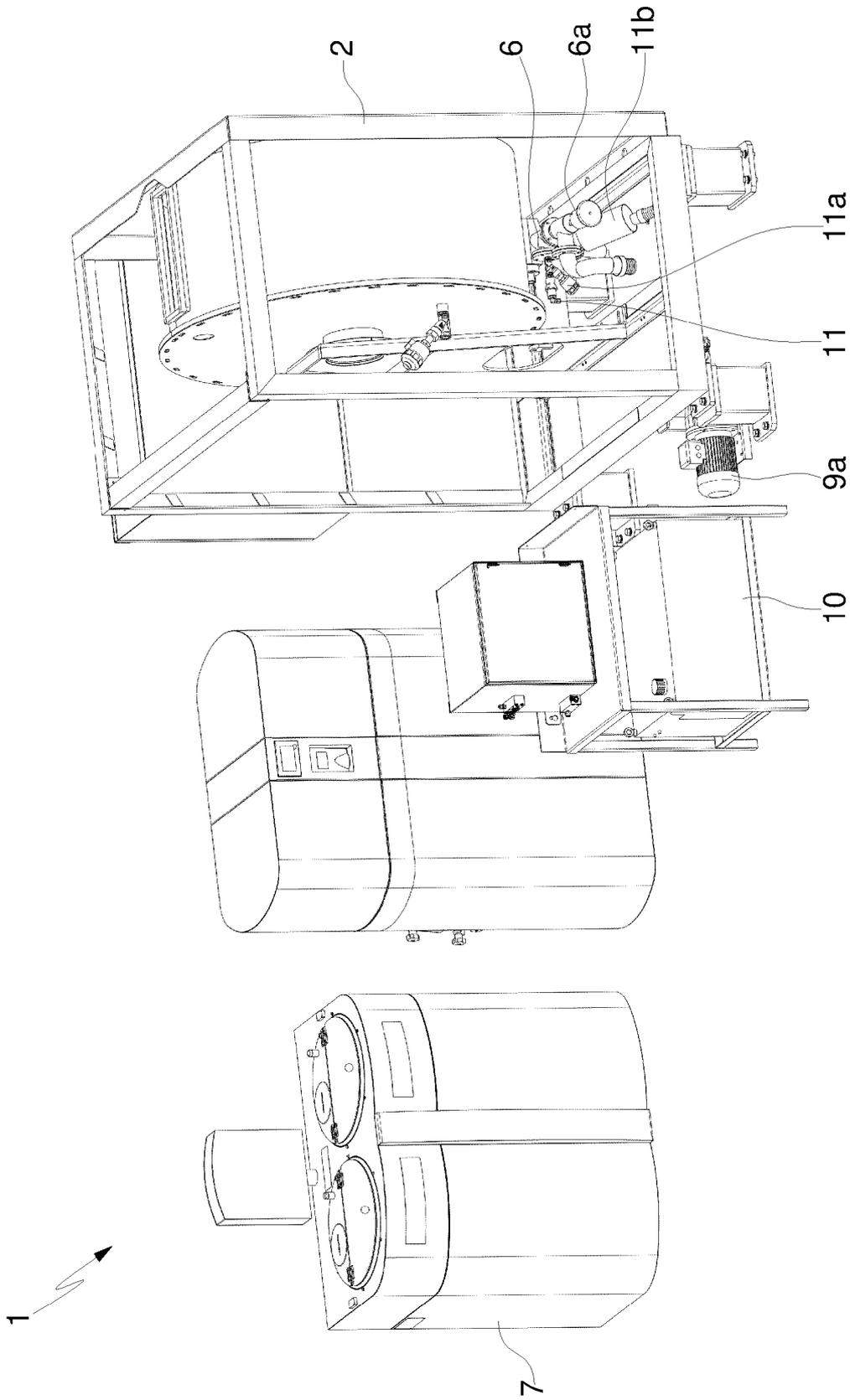


FIG. 1

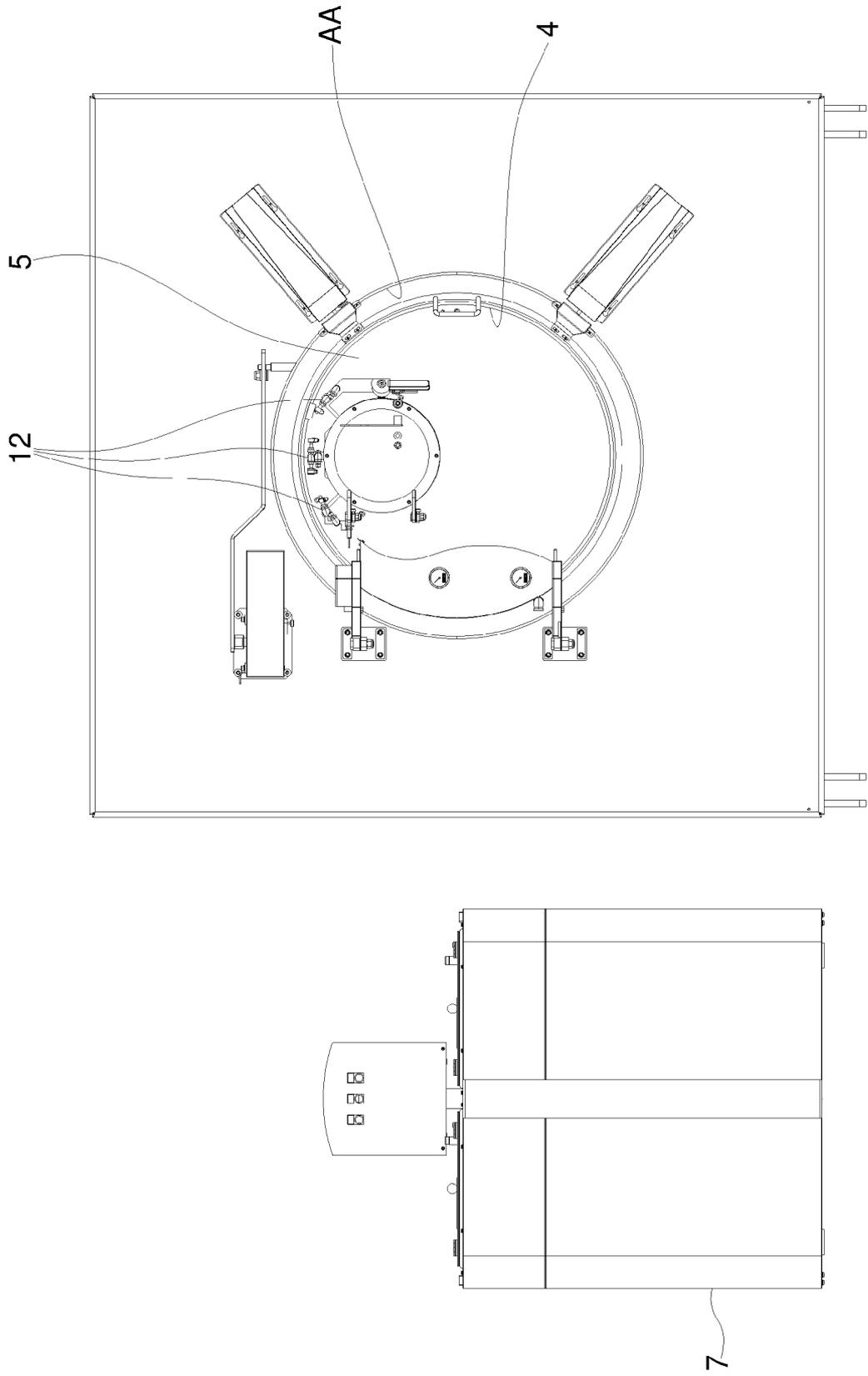


FIG. 2

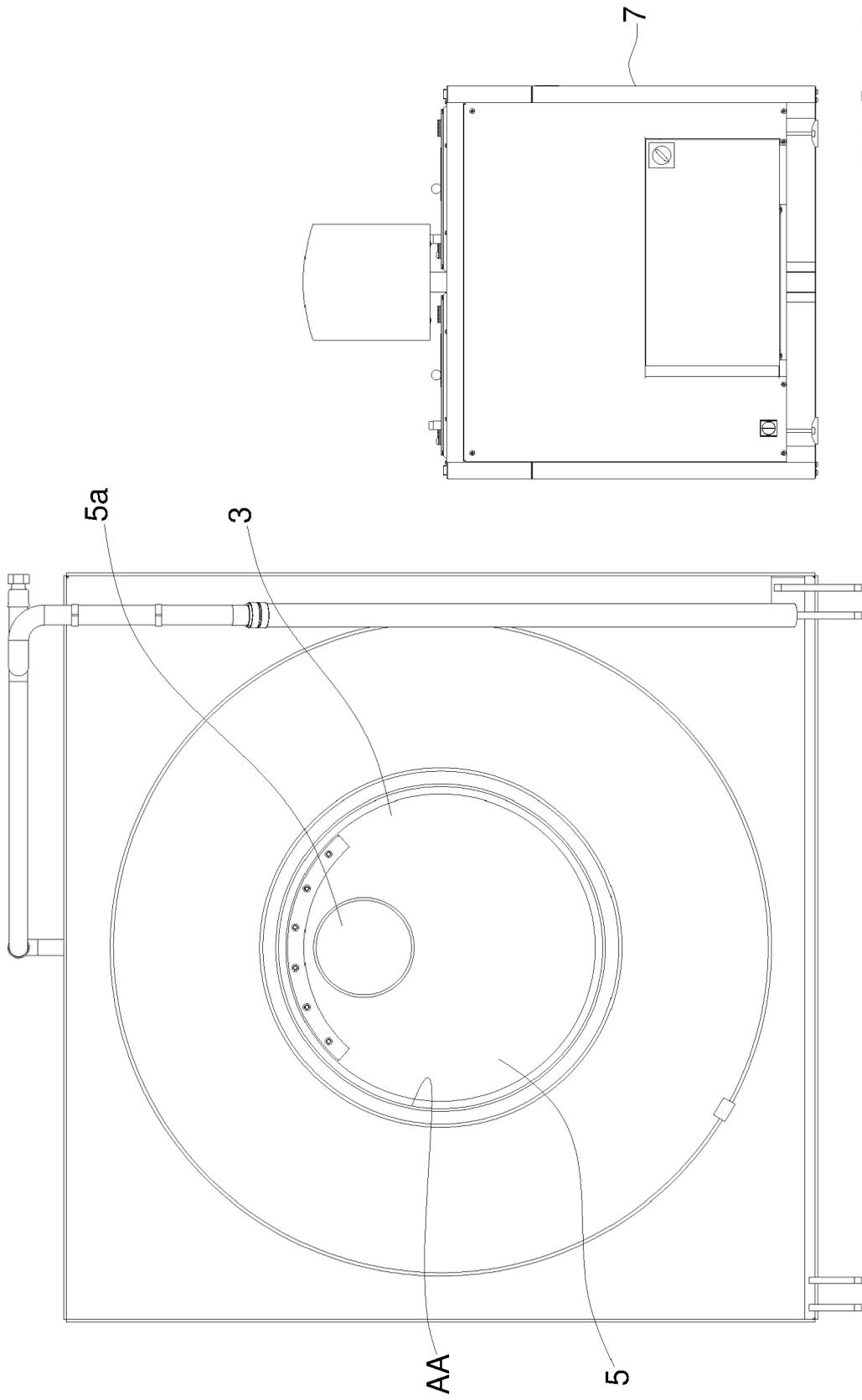


FIG. 3

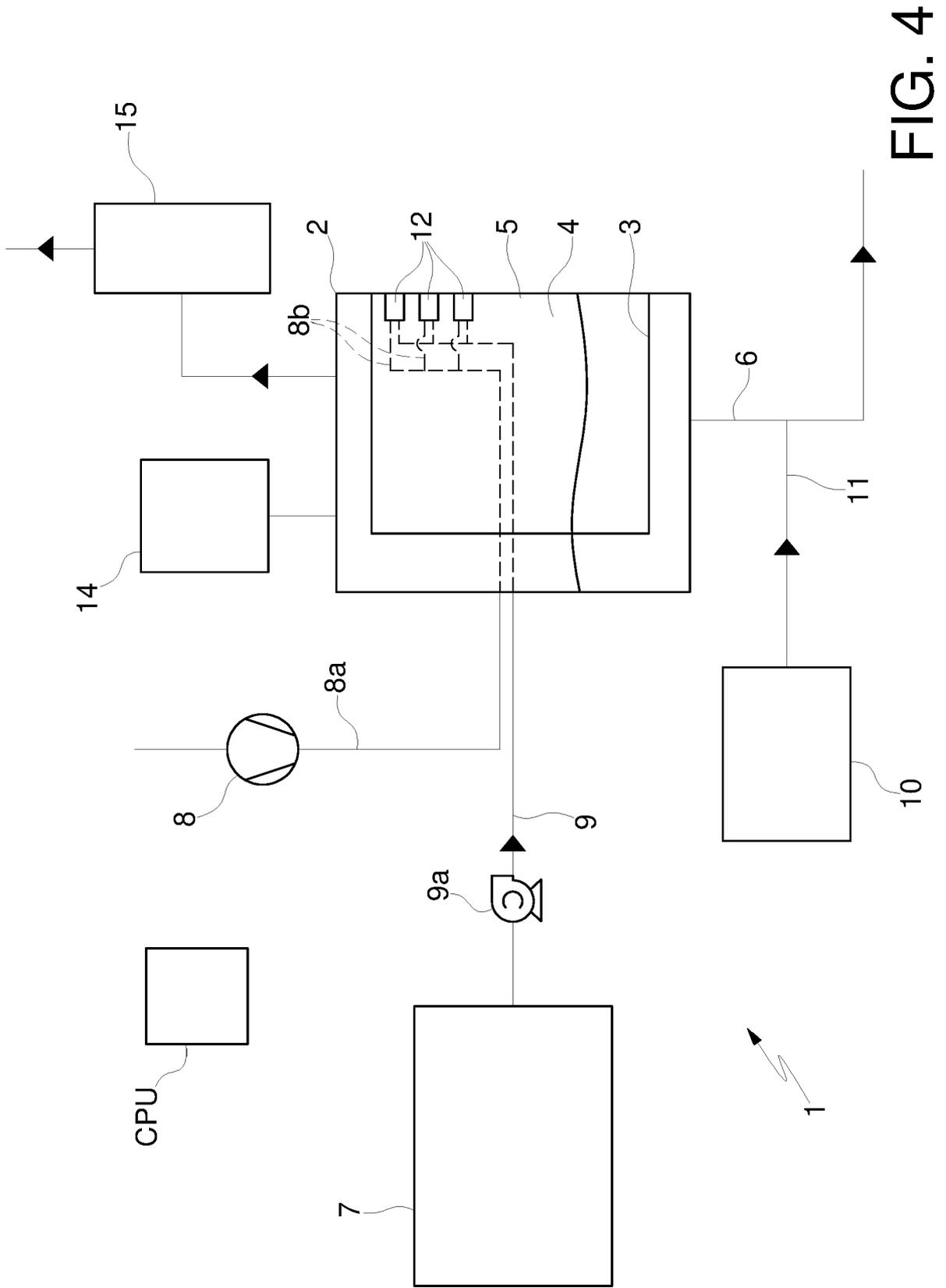


FIG. 4



EUROPEAN SEARCH REPORT

Application Number  
EP 20 20 2905

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	DE 10 2011 089386 A1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 27 June 2013 (2013-06-27) * paragraphs [0001], [0002], [0031] - [0036], [0042] - [0051], [0072] - [0095]; claims; figures *	1-16	INV. D06B11/00 D06B3/30 D06F35/00
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