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(54) **WASHER DEVICE**

SPÜLVORRICHTUNG

DISPOSITIF DE LAVAGE

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Description

Field of the Invention

[0001] The present invention relates to washer devices comprising steam generator.

Background Art

[0002] Washer devices especially such as dishwashers and washing machines may employ steam generators, as known for example from WO2008/147033A1, that facilitate washing process by softening the dried stains, for example. In the said steam generators, liquid (i.e. mains water) received from a liquid source (i.e. water mains) is heated and converted into steam. The obtained steam is introduced into a washing chamber containing the washed articles, during the washing process or prior to the washing process. Steam with a high temperature softens any stains on the articles included in the washing chamber and ensures a simpler and more effective washing process.

[0003] The washing liquid (i.e. water, a mixture of water and detergent) in the washer devices is circulated throughout a washing process. The washing liquid collected at the bottom of the washing chamber by means of gravity may be supplied to upper sections of the washing chamber through a circulation system. The washing liquid may be heated, when required, during the said circulation process. In this way, the washing liquid is continuously maintained at the desired temperature during the washing process.

[0004] The state-of-art document EP2031116A1 discloses a steam generator suitable for use in washer devices. Said steam generator operates independent from the water control systems of the washer device (i.e. water inlet/outlet systems and/or circulation system of the washer device). However, such independent operation of the steam generator and water control system restricts functionality of the washer device.

[0005] In another state-of-art document US2008/236624A1 a dishwasher and a control method of the same is disclosed. The dishwasher comprises a washing compartment, a water supply tube, a sump, a water discharge tube, a first heater in the sump, a steam generator which operates independently from the first heater, a circulation pump for pumping and spraying wash water in the collection chamber to a rack via a spray arm. According to the invention of the document US2008/236624A1, the washing water received from water supply tube is supplied to the steam generator via line 260 and the washing water received from the sump is supplied to the steam generator via line 328. Using two different lines increases complexity and production cost of the dishwasher and also requires additional control processes in order to regulate the washing water pass according to different washing operations.

Brief Description of the Invention

[0006] The washer device according to the present invention comprises the combined features of claim 1.

[0007] In the washer device of the present invention, the steam generator is allowed to operate in conjunction with other components. Thus, the steam generator and/or other components are allowed to operate with different functions so as to meet disparate needs of the users (for example, even if the heating unit of the washer device fails, the washing liquid may be heated).

Object of the Invention

[0008] An object of the present invention is to provide a washer device comprising steam generator.

[0009] Another object of the present invention is to provide a washer device wherein the steam generator is able to operate in conjunction with other components.

[0010] Another object of the present invention is to provide a washer device that ensures that the steam generator included therein is cleaned while being used.

[0011] A further object of the present invention is to provide a washer device that heats the washing liquid without a heating unit or even if the heating unit therein fails.

[0012] A different object of the present invention is to provide a washer device that provides better cleaning of highly soiled articles.

[0013] Still another object of the present invention is to provide a reliable washer device.

Description of the Drawings

[0014] Exemplary embodiments of the washer device according to the present invention are illustrated in the accompanying drawings, in which:

Figure 1 is an exemplary embodiment of the inventive washer device, shown in the form of block.

Figure 2 is another exemplary embodiment of the inventive washer device, shown in the form of block.

Figure 3 is a further exemplary embodiment of the inventive washer device, shown in the form of block.

Figure 4 is a different exemplary embodiment of the inventive washer device, shown in the form of block.

Figure 5 is another exemplary embodiment of the inventive washer device, shown in the form of block.

Figure 6 is a further exemplary embodiment of the inventive washer device, shown in the form of block.

[0015] All the parts illustrated in the drawings are individually assigned a reference numeral and the corre-

sponding terms of these numbers are listed as follows:

Washer device	(M)
Liquid level	(a)
Washing chamber	(1)
Washing liquid inlet	(2)
Collection chamber	(3)
Valve for collection chamber	(3a)
Washing liquid outlet	(4)
Outlet valve	(4a)
Steam generator	(5)
Steam generator valve	(5a)
Steam inlet	(6)
First T connection	(7)
Inlet filter	(8)
Inlet valve	(9)
Circulation pump	(10)
Heating unit	(11)
Steam generator pump	(12)
Second T connection	(13)
Outlet pump	(14)

Description of the Invention

[0016] In the washer devices (i.e. dishwasher or washing machine etc.) that wash the articles placed inside an inner chamber, steam generators are used which supplies steam onto the articles to be washed in order to provide better cleaning of especially dried stains on the articles. Said steam generators operate as a separate unit in the washer device. This results in a restriction in the operation functionalities of the steam generator and thus the washer device. Therefore, with the present invention, there is provided a washer device wherein the steam generator is able to operate in conjunction with other components.

[0017] The washer device (M) according to the present invention, as illustrated in figures 1-6 as a dishwasher, comprises at least one washing chamber (1) wherein the articles to be washed are placed and the washing process is performed; at least one washing liquid inlet (2) through which washing liquid (i.e. water from the mains) for washing and/or rinsing processes is received; at least one collection chamber (3) which is located under the washing chamber (1) and wherein the washing liquid received from the washing liquid inlet (2) is collected; at least one washing liquid outlet (4) which is connected with the said collection chamber (3) and which discharges the liquid collected in the collection chamber (3) at the end of the washing and/or rinsing process; and at least one steam generator (5) which heats the washing liquid received from the said washing liquid inlet (2) and/or collection chamber (3) and supplies it into the washing chamber (1) through at least one steam inlet (6) connected with the washing chamber (1). Said steam generator (5) is preferably positioned in alignment with the bottom of the washer chamber (1). Since the said steam generator (5) heats the washing liquid received from the washing liquid inlet (2) and/or collected in the collection chamber (3) and supplies it into the washing chamber (1), the steam generator (5) may be used for different functions.

[0018] As shown in figures 1-3, 5 and 6, the washer device (M) of the present invention further comprises at least a first T connection (7) which is connected at one side with the washing liquid inlet (2), and at another side, with the collection chamber (3) and at the other, with the steam generator (5) and which supplies the washing liquid received from the washing liquid inlet (2) into the collection chamber (3) and the steam generator (5). In this embodiment, the washing liquid supplied into the washer device (M) is, at the same time, sent to the collection chamber (3) and the steam generator (5). Here, when the washing liquid received into the washer device (M) reaches to a liquid level (a), and then the washing liquid has filled the collection chamber (3) and reached to the level of the steam generator (5). In this way, the steam generator (5) is operated to boil the water, so it is used to heat the washing liquid in the collection chamber (3) in addition to supplying hot steam into the washing chamber (1). With this embodiment, a direct connection between the steam generator (5) and the collection chamber (3) is established and accordingly, instead of the washing liquid that is boiled and evaporated in the steam generator (5) and sent to the washing chamber (1), the washing liquid in the collection chamber (3) is refilled into the steam generator (5) by means of gravity. In this way, the steam generator (5) is able to perform a heating process in a continuous manner.

[0019] As shown in figure 3, the washer device (M) also comprises at least one steam generator pump (12) which is interposed between the said first T connection (7) and the steam generator (5) and which allows the washing liquid in the collection chamber (3) to pass through the steam generator (5) into the washing chamber (1). With the said steam generator pump (12), the washing liquid in the collection chamber (3) is heated in the steam generator (5) and sent to the washing chamber (1) during the operation of the washer device (M). Here, the washing liquid received from the collection chamber (3) is able to be turned into a hot washing liquid in the steam generator (5) and sent to the washing chamber (1) in case the steam generator pump (12) is operated. Since the washing liquid circulated by means of the steam generator pump (12) will have a higher temperature while being passed through the steam generator (5), if highly soiled articles are placed into an area close to the steam inlet (6), the washing liquid will initially strike on these articles so that such articles may be cleaned more efficiently. In case the steam generator pump (12) is optionally (according to a program) not operated, the steam generator (5) only generates steam and the washing liquid received from the collection chamber (3) is introduced into the washing chamber (1) as a steam. Thus, the wash-

ing liquid received into the washing chamber (1) may be heated by means of the steam generator (5). Furthermore, the need of the washer device (M) for an additional heater to heat the washing liquid is eliminated.

[0020] Yet the washer device (M) of the present invention comprises at least one circulation pump (10) that supplies the washing liquid collected in the collection chamber (3) into the washing chamber (1). In this embodiment, the washer device (M) also preferably comprises at least one heating unit (11) which is interposed between the circulation pump (10) and the washing chamber (1) and which heats the washing liquid supplied into the washing chamber (1). Although the washing liquid is heated by the steam generator (5) in the washer device (M) provided with a single steam generator (5) used in figures 1-4, the heating unit (11) may be used in order to extend the lifetime of the steam generator (5), in particular, and to reduce the washing time. In case the said heating unit (11) fails, the washing liquid is heated by the steam generator (5). Particularly, in case at least two steam generators are used, as shown in figures 5 and 6, the heating unit (11) may totally eliminated and the washing liquid may heated by the steam generators (5). Furthermore, with the use of at least two steam generators (5), an intensive steam is generated and the time for heating the water is reduced.

[0021] In a preferred embodiment of the invention as shown in figure 2, the washer device (M) comprises at least one valve (3a) for collection chamber which is interposed between the said first T connection (7) and the collection chamber (3) and which controls the washing liquid supplied from the first T connection (7) into the collection chamber (3). In this embodiment, when feeding washing liquid into the washer device (M) through a washing liquid inlet (2), for example, the valve (3a) for the collection chamber is switched into a closed position so as to feed the entire washing liquid into the washer chamber (1) via the steam generator (5). Thus, while feeding liquid into the washing chamber (1) through the washing liquid inlet (2) (for example, while feeding water from the mains), the steam generator (5) is cleaned efficiently. After the washing liquid is received, the valve (3a) for the collection chamber is switched into an opened position and thus the washing liquid in the collection chamber (3) is filled into the steam generator (5) by means of gravity.

[0022] Thanks to the abovementioned embodiments, the washing liquid received into the washing chamber (1) may be heated by means of the steam generator (5). With this embodiment, the need of the washer device (M) for an additional heater to heat the washing liquid is eliminated.

[0023] In another preferred embodiment of the invention, the washer device (M) comprises at least one outlet pump (14) that supplies the washing liquid collected in the collection chamber (3) into the washing liquid outlet (4). In this embodiment, the washer device (M) also comprises at least a second T connection (13) which is connected at one side with the outlet pump (14), and at another side, with the washing liquid outlet (4) and at the other, with the steam generator (5); at least one outlet valve (4a) which is interposed between the second T connection (13) and the washing liquid outlet (4) and which controls liquid passage between the second T connection (13) and the washing liquid outlet (4); and at least one steam generator valve (5a) which is interposed between the second T connection (13) and the steam generator (5) and which controls liquid passage between the second T connection (13) and the steam generator (5). In this embodiment, while the washer device (M) receives washing liquid or the washer device (M) is being operated, the outlet valve (4a) is in its closed position and the steam generator valve (5a) is in its opened position. Thus, the outlet pump (14) supplies the washing liquid in the collection chamber (3) into the washing chamber (1) via the steam generator (5). In order to discharge the washing liquid inside the collection chamber (3) from the washer device (M), the outlet valve (4a) is brought into an opened position and the steam generator valve (5a) is brought into a closed position. Alternatively, the washer device (M) comprises at least one three-way valve (not shown) which is connected at one side with the outlet pump (14), and at another side, with the washing liquid outlet (4) and at the other, with the steam generator (5), and which selectively supplies the washing liquid fed by the outlet pump (14) into the steam generator (5) or the washing liquid outlet (4). Since the washing liquid circulated by means of the outlet pump (14) will have a higher temperature while being passed through the steam generator (5), if highly soiled articles are placed into an area close to the steam inlet (6), the washing liquid will initially strike on these articles so that such articles may be cleaned more efficiently. Furthermore, the washing liquid received into the washing chamber (1) may be heated by means of the steam generator (5) and the need of the washer device (M) for an additional heater to heat the washing liquid is eliminated.

[0024] In an illustrative embodiment of the invention, the washer device (M) comprises at least one inlet filter (8) which filters the washing liquid received from the washing liquid inlet (2) before it is sent to the collection chamber (3) and/or steam generator (5). Thanks to the inlet filter (8) which is preferably in the form of a resin container, foreign substances (i.e. scale) contained in the washing liquid received into the washer device (M) are removed.

[0025] In another illustrative embodiment of the invention, the washer device (M) comprises at least one inlet valve (9) connected with the washing liquid inlet (2) for receiving the washing liquid from the washing liquid inlet (2) in a controlled manner.

[0026] A method for operation of the above-mentioned washer device (M) comprises the steps of receiving the washing liquid through the washing liquid inlet (2); supplying the washing liquid received from the washing liquid inlet (2) into the washing chamber (1) by means of the

steam generator (5) and the collection chamber (3); and finishing the receiving of the washing liquid through the washing liquid inlet (2) when the liquid in the washing chamber (1) has reached to a predetermined liquid level (a). In this embodiment, since the washing liquid received from the washing liquid inlet (2) is passed through the steam generator (5), the steam generator (5) is also cleaned.

[0027] Another method for operation of the above-mentioned washer device (M) comprises the steps of receiving the washing liquid through the washing liquid inlet (2); supplying the washing liquid received from the washing liquid inlet (2) into the washing chamber (1) by means of the steam generator (5); and finishing the receiving of the washing liquid through the washing liquid inlet (2) when the liquid in the washing chamber (1) has reached to a predetermined liquid level (a). In this embodiment, since the washing liquid, in total (or almost in total), is passed through the steam generator (5) and into the washing chamber (1), the washing liquid supplied into the washing chamber (3) is heated in the steam generator (5), when necessary. Here, supply of the washing liquid into washing chamber (1) by means of the steam generator (5) is performed by closing the said valve (3a) for the collection chamber and/or operating the steam generator pump (12).

[0028] A further method for operation of the above-mentioned washer device (M) comprises the step of supplying the washing liquid accumulated in the collection chamber (3) into the washing chamber (1) by being passed through the steam generator (5). In this embodiment, the washing liquid accumulated in the collection chamber (3) is passed through the steam generator (5) using the steam generator pump (12) or outlet pump (14). By passing the washing liquid through the steam generator (5), the washing liquid is heated or converted into steam so as to be supplied into the washing chamber (1).

[0029] In the washer device (M) of the present invention, the steam generator (5) is allowed to operate in conjunction with other components. Thus, the steam generator (5) and/or other components are allowed to operate with different functions so as to meet disparate needs of the users (for example, even if the heating unit of the washer device fails, the washing liquid may be heated).

Claims

1. A washer device (M) comprising

- at least one washing chamber (1) wherein the articles to be washed are placed and the washing process is performed;
- at least one washing liquid inlet (2) through which washing liquid for washing and/or rinsing processes is received;
- at least one collection chamber (3) which is located under the washing chamber (1) and wherein the washing liquid received from the washing liquid inlet (2) is collected;
- at least one washing liquid outlet (4) which is connected with the said collection chamber (3) and which discharges the liquid collected in the collection chamber (3) at the end of the washing and/or rinsing process;
- at least one steam generator (5) which heats the washing liquid received from the said washing liquid inlet (2) and/or collection chamber (3) and supplies it into the washing chamber (1) through at least one steam inlet (6) connected with the washing chamber (1);
- at least a first T connection (7) which connects a first opening with the washing liquid inlet (2), a second opening with the collection chamber (3) and a third opening with the steam generator (5) and which supplies the washing liquid received from the washing liquid inlet (2) into the collection chamber (3) and the steam generator (5);
- at least one steam generator pump (12) which is interposed between the said first T connection (7) and the steam generator (5) and which allows the washing liquid in the collection chamber (3) to pass through the steam generator (5) into the washing chamber (1) and
- at least one circulation pump (10) that supplies the washing liquid collected in the collection chamber (3) into the washing chamber (1).

2. A washer device (M) according to claim 1, **characterized by** comprising at least one valve (3a) for collection chamber which is interposed between the said first T connection (7) and the collection chamber (3) and which controls the supply of the washing liquid from the first T connection (7) into the collection chamber (3) through said second opening.

3. A washer device (M) according to claim 1, **characterized by** comprising at least one outlet pump (14) that supplies the washing liquid collected in the collection chamber (3) into the washing liquid outlet (4).

4. A washer device (M) according to claim 3, **characterized by** comprising at least a second T connection (13) which connects a fourth opening with the outlet pump (14), a fifth opening with the washing liquid outlet (4) and a sixth opening with the steam generator (5); at least one outlet valve (4a) which is interposed between the second T connection (13) and the washing liquid outlet (4) and which controls liquid passage between the second T connection (13) and the washing liquid outlet (4) through said fifth opening; and at least one steam generator valve (5a) which is interposed between the second T connection (13) and the steam generator (5) and which controls liquid passage between the second T connec-

tion (13) and the steam generator (5) through said sixth opening.

5. A washer device (M) according to claim 3, **characterized by** comprising at least one three-way valve which is connected at one side with the outlet pump (14), and at another side, with the washing liquid outlet (4) and at the other, with the steam generator (5), and which selectively supplies the washing liquid fed by the outlet pump (14) into the steam generator (5) or the washing liquid outlet (4).

6. A washer device (M) according to claim 1, **characterized by** comprising at least one inlet filter (8) which filters the washing liquid received from the washing liquid inlet (2) before it is sent to the collection chamber (3) and/or steam generator (5).

7. A washer device (M) according to claim 6, **characterized in that** the said inlet filter (8) is in the form of a resin container.

8. A washer device (M) according to claim 1, **characterized by** comprising at least one inlet valve (9) connected with the washing liquid inlet (2) for receiving the washing liquid from the washing liquid inlet (2) in a controlled manner.

9. A washer device (M) according to claim 1, **characterized by** comprising at least one heating unit (11) which is interposed between the circulation pump (10) and the washing chamber (1) and which heats the washing liquid supplied into the washing chamber (1).

10. A washer device (M) according to claim 1, **characterized by** comprising at least two steam generators (5).

Patentansprüche

1. Waschvorrichtung (M) mit

- wenigstens einer Waschkammer (1), in der die zu waschenden Artikel platziert werden und in der der Waschvorgang ausgeführt wird,
- wenigstens einem Waschflüssigkeitseinlass (2), durch den Waschflüssigkeit für Wasch- und/oder Spülvorgänge aufgenommen wird,
- wenigstens einer Sammelkammer (3), die sich unter der Waschkammer (1) befindet und in der von dem Waschflüssigkeitseinlass (2) aufgenommene Waschflüssigkeit gesammelt wird,
- wenigstens einem Waschflüssigkeitsauslass (4), der mit der Sammelkammer (3) verbunden ist und der die in der Sammelkammer (3) gesammelte Flüssigkeit am Ende des Wasch- und/oder Spülvorgangs ableitet,
- wenigstens einem Dampfgenerator (5), der die von dem Waschflüssigkeitseinlass (2) und/oder der Sammelkammer (3) aufgenommene Waschflüssigkeit erhitzt und sie durch wenigstens einen mit der Waschkammer (1) verbundenen Dampfeinlass (6) in die Wasch kammer (1) fördert,
- wenigstens einer ersten T-Verbindung (7), die eine erste Öffnung mit dem Waschflüssigkeitseinlass (2), eine zweite Öffnung mit der Sammelkammer (3) und eine dritte Öffnung mit dem Dampfgenerator (5) verbindet und die die von dem Waschflüssigkeitseinlass (2) aufgenommene Waschflüssigkeit in die Sammelkammer (3) und den Dampfgenerator (5) befördert,
- wenigstens einer Dampfgeneratorpumpe (12), die zwischen der ersten T-Verbindung (7) und dem Dampfgenerator (5) angeschlossen ist und die es der Waschflüssigkeit in der Sammelkammer (3) ermöglicht, durch den Dampfgenerator (5) in die Waschkammer (1) zu fließen und
- wenigstens einer Zirkulationspumpe (10), die die in der Sammelkammer (3) gesammelte Waschflüssigkeit in die Waschkammer (1) fördert.

2. Waschvorrichtung (M) nach Anspruch 1, **dadurch gekennzeichnet, dass** sie wenigstens ein Ventil (3a) für die Sammelkammer aufweist, das zwischen der T-Verbindung (7) und der Sammelkammer (3) angeschlossen ist und das die Zufuhr von Waschflüssigkeit aus der ersten T-Verbindung (7) durch die zweite Öffnung in die Sammelkammer (3) steuert.

3. Waschvorrichtung (M) nach Anspruch 1, **dadurch gekennzeichnet, dass** sie wenigstens eine Auslasspumpe (14) aufweist, die in der Sammelkammer (3) gesammelte Waschflüssigkeit in den Waschflüssigkeitsauslass (4) fördert.

4. Waschvorrichtung (M) nach Anspruch 3, **dadurch gekennzeichnet, dass** sie wenigstens eine zweite T-Verbindung (13), die eine vierte Öffnung mit der Auslasspumpe (14), eine fünfte Öffnung mit dem Waschflüssigkeitsauslass (4) und eine sechste Öffnung mit dem Dampfgenerator (5) verbindet, wenigstens ein Auslassventil (4a), das zwischen der zweiten T-Verbindung (13) und dem Waschflüssigkeitsauslass (4) angeschlossen ist und das den Flüssigkeitsdurchgang zwischen der zweiten T-Verbindung (13) und dem Waschflüssigkeitsauslass (4) durch die fünfte Öffnung steuert, und wenigstens ein Dampfgeneratorventil (5a) aufweist, das zwischen der zweiten T-Verbindung (13) und dem Dampfgenerator (5) angeschlossen ist und das den Flüssigkeitsdurchgang zwischen der zweiten T-Verbindung (13) und dem Dampfgenerator (5) durch die sechste

Öffnung steuert.

5. Waschvorrichtung (M) nach Anspruch 3, **dadurch gekennzeichnet, dass** sie wenigstens ein Dreiwegeventil aufweist, das an einer Seite mit der Auslasspumpe (14) und an einer anderen Seite mit dem Waschflüssigkeitsauslass (4) verbunden ist und an einer anderen Seite mit dem Dampfgenerator (5) verbunden ist und das die durch die Auslasspumpe (14) geförderte Waschflüssigkeit dem Dampfgenerator (5) oder dem Waschflüssigkeitsauslass (4) zuführt.

6. Waschvorrichtung (M) nach Anspruch 1, **dadurch gekennzeichnet, dass** sie wenigstens einen Einlassfilter (8) aufweist, der die von dem Waschflüssigkeitseinlass (2) aufgenommene Waschflüssigkeit filtert, bevor sie in die Sammelkammer (3) und/oder den Dampfgenerator (5) geleitet wird.

7. Waschvorrichtung (M) nach Anspruch 6, **dadurch gekennzeichnet, dass** der Einlassfilter (8) in der Form eines Kunststoffbehälters vorliegt.

8. Waschvorrichtung (M) nach Anspruch 1, **dadurch gekennzeichnet, dass** sie wenigstens ein Einlassventil (9) aufweist, das mit dem Waschflüssigkeitseinlass (2) verbunden ist, um die Waschflüssigkeit aus dem Waschflüssigkeitseinlass (2) in gesteuerter Weise aufzunehmen.

9. Waschvorrichtung (M) nach Anspruch 1, **dadurch gekennzeichnet, dass** sie wenigstens eine Heizeinheit (11) aufweist, die zwischen der Zirkulationspumpe (10) und der Waschkammer (1) angeordnet ist und die die in die Waschkammer (1) geförderte Waschflüssigkeit erhitzt.

10. Waschvorrichtung (M) nach Anspruch 1, **dadurch gekennzeichnet, dass** sie wenigstens zwei Dampfgeneratoren (5) aufweist.

Revendications

1. Dispositif de lavage (M) comprenant

- au moins une chambre de lavage (1) dans laquelle les articles à laver sont placés et le processus de lavage est exécuté ;
- au moins une entrée de liquide de lavage (2) à travers laquelle du liquide de lavage pour des processus de nettoyage et/ou de rinçage est reçu ;
- au moins une chambre de collecte (3) qui est située sous la chambre de lavage (1) et dans laquelle le liquide de lavage reçu depuis l'entrée de liquide de lavage (2) est collecté ;
- au moins une sortie de liquide de lavage (4) qui est raccordée à ladite chambre de collecte (3) et qui déverse le liquide collecté dans la chambre de collecte (3) à la fin du processus de lavage et/ou de rinçage ;
- au moins un générateur de vapeur (5) qui chauffe le liquide de lavage reçu depuis ladite entrée de liquide de lavage (2) et/ou la chambre de collecte (3) et le fournit dans la chambre de lavage (1) à travers au moins une entrée de vapeur (6) raccordée à la chambre de lavage (1) ;
- au moins un premier raccordement en T (7) qui raccorde une première ouverture à l'entrée de liquide de lavage (2), une deuxième ouverture à la chambre de collecte (3) et une troisième ouverture au générateur de vapeur (5) et qui fournit le liquide de lavage reçu depuis l'entrée de liquide de lavage (2) dans la chambre de collecte (3) et le générateur de vapeur (5) ;
- au moins une pompe de générateur de vapeur (12) qui est interposée entre ledit premier raccordement en T (7) et le générateur de vapeur (5) et qui permet au liquide de lavage dans la chambre de collecte (3) de passer à travers le générateur de vapeur (5) dans la chambre de lavage (1) et
- au moins une pompe de circulation (10) qui fournit le liquide de lavage collecté dans la chambre de collecte (3) dans la chambre de lavage (1).

2. Dispositif de lavage M) selon la revendication 1, **caractérisé en ce qu'**il comprend au moins une soupape (3a) pour la chambre de collecte qui est interposée entre ledit premier raccordement en T (7) et la chambre de collecte (3) et qui commande l'alimentation du liquide de lavage depuis le premier raccordement en T (7) dans la chambre de collecte (3) à travers ladite deuxième ouverture.

3. Dispositif de lavage (M) selon la revendication 1, **caractérisé en ce qu'**il comprend au moins une pompe de sortie (14) qui fournit le liquide de lavage collecté dans la chambre de collecte (3) dans la sortie de liquide de lavage (4).

4. Dispositif de lavage (M) selon la revendication 3, **caractérisé en ce qu'**il comprend au moins un second raccordement en T (13) qui raccorde une quatrième ouverture à la pompe de sortie (14), une cinquième ouverture à la sortie de liquide de lavage (4) et une sixième ouverture au générateur de vapeur (5) ; au moins une soupape de sortie (4a) qui est interposée entre le second raccordement en T (13) et la sortie de liquide de lavage (4) et qui commande un passage de liquide entre le second raccordement en T (13) et la sortie de liquide de lavage (4) à travers ladite cinquième ouverture ; et au moins une soupape de

générateur de vapeur (5a) qui est interposée entre le second raccordement en T (13) et le générateur de vapeur (5) et qui commande un passage de liquide entre le second raccordement en T (13) et le générateur de vapeur (5) à travers ladite sixième ouverture.

5. Dispositif de lavage (M) selon la revendication 3, **caractérisé en ce qu'**il comprend au moins une soupape à trois voies qui est raccordée au niveau d'un côté à la pompe de sortie (14), et au niveau d'un autre côté, à la sortie de liquide de lavage (4) et au niveau de l'autre, au générateur de vapeur (5), et qui fournit sélectivement le liquide de lavage alimenté par la pompe de sortie (14) dans le générateur de vapeur (5) ou la sortie de liquide de lavage (4).

6. Dispositif de lavage (M) selon la revendication 1, **caractérisé en ce qu'**il comprend au moins un filtre d'entrée (8) qui filtre le liquide de lavage reçu depuis l'entrée de liquide de lavage (2) avant qu'il ne soit envoyé à la chambre de collecte (3) et/ou au générateur de vapeur (5).

7. Dispositif de lavage (M) selon la revendication 6, **caractérisé en ce que** ledit filtre d'entrée (8) est sous la forme d'un récipient en résine.

8. Dispositif de lavage (M) selon la revendication 1, **caractérisé en ce qu'**il comprend au moins une soupape d'entrée (9) raccordée à l'entrée de liquide de lavage (2) pour recevoir le liquide de lavage depuis l'entrée de liquide de lavage (2) d'une manière commandée.

9. Dispositif de lavage (M) selon la revendication 1, **caractérisé en ce qu'**il comprend au moins une unité de chauffage (11) qui est interposée entre la pompe de circulation (10) et la chambre de lavage (1) et qui chauffe le liquide de lavage fourni dans la chambre de lavage (1).

10. Dispositif de lavage (M) selon la revendication 1, **caractérisé en ce qu'**il comprend au moins deux générateurs de vapeur (5).

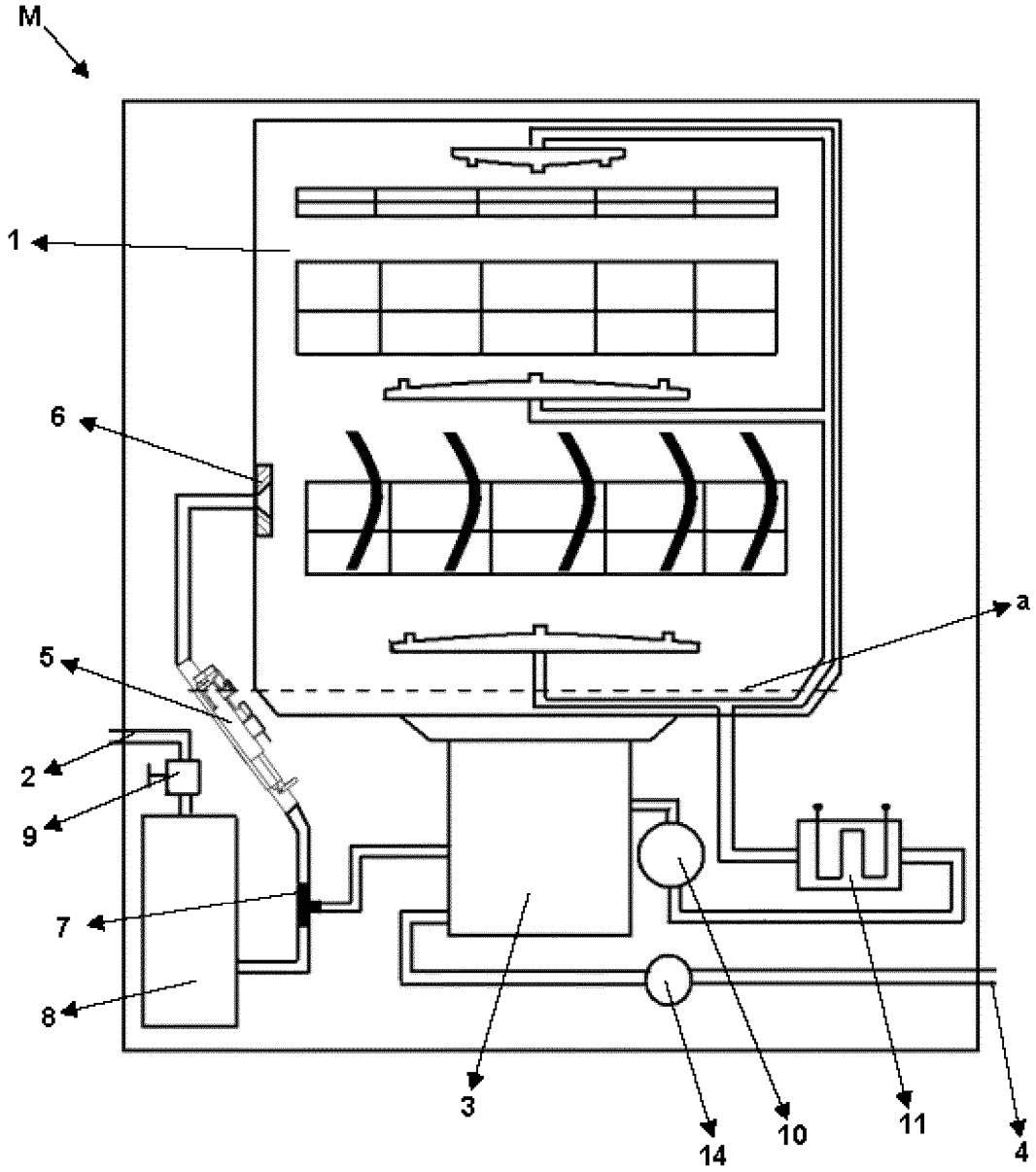

Figure – 1

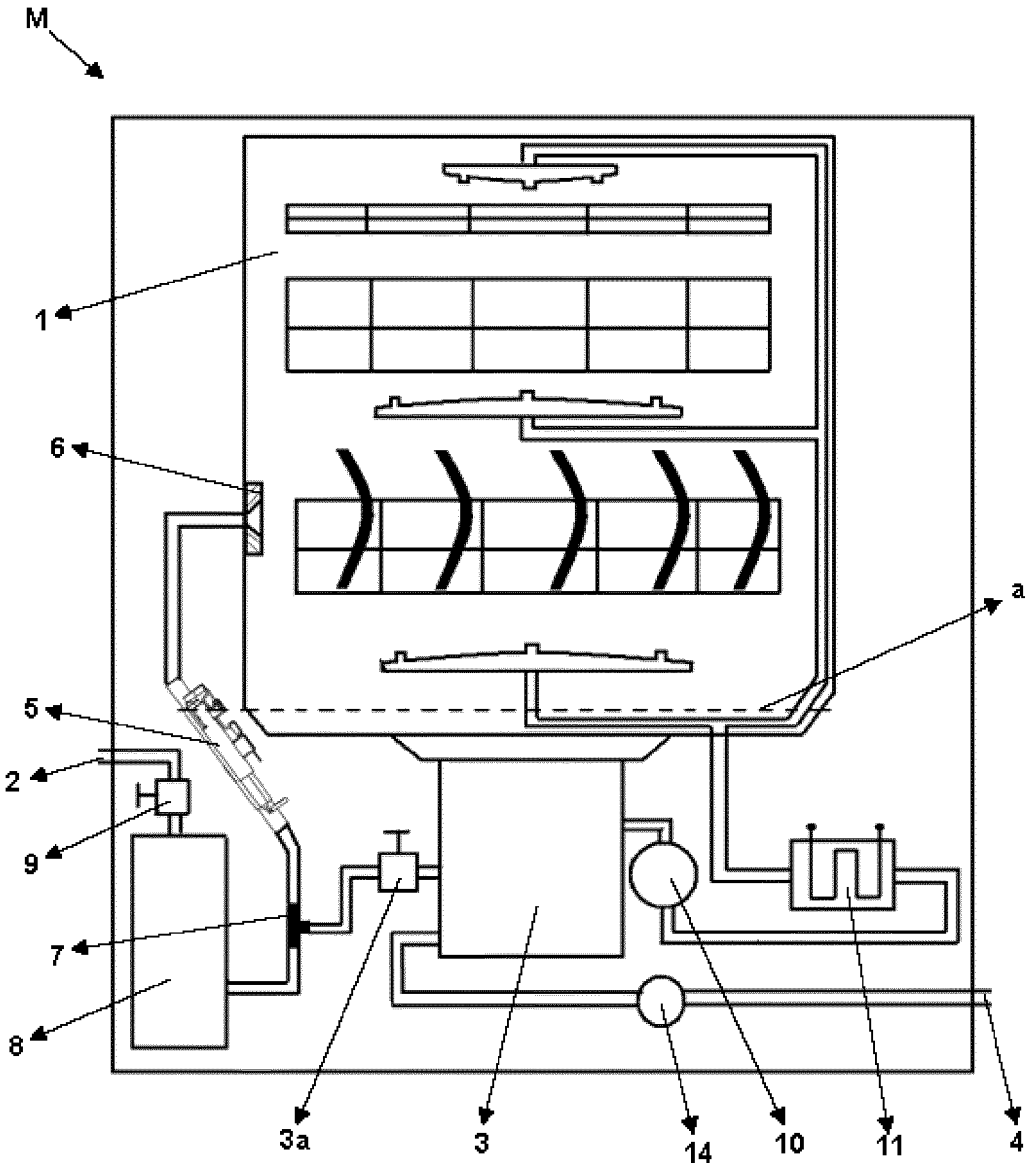

Figure – 2

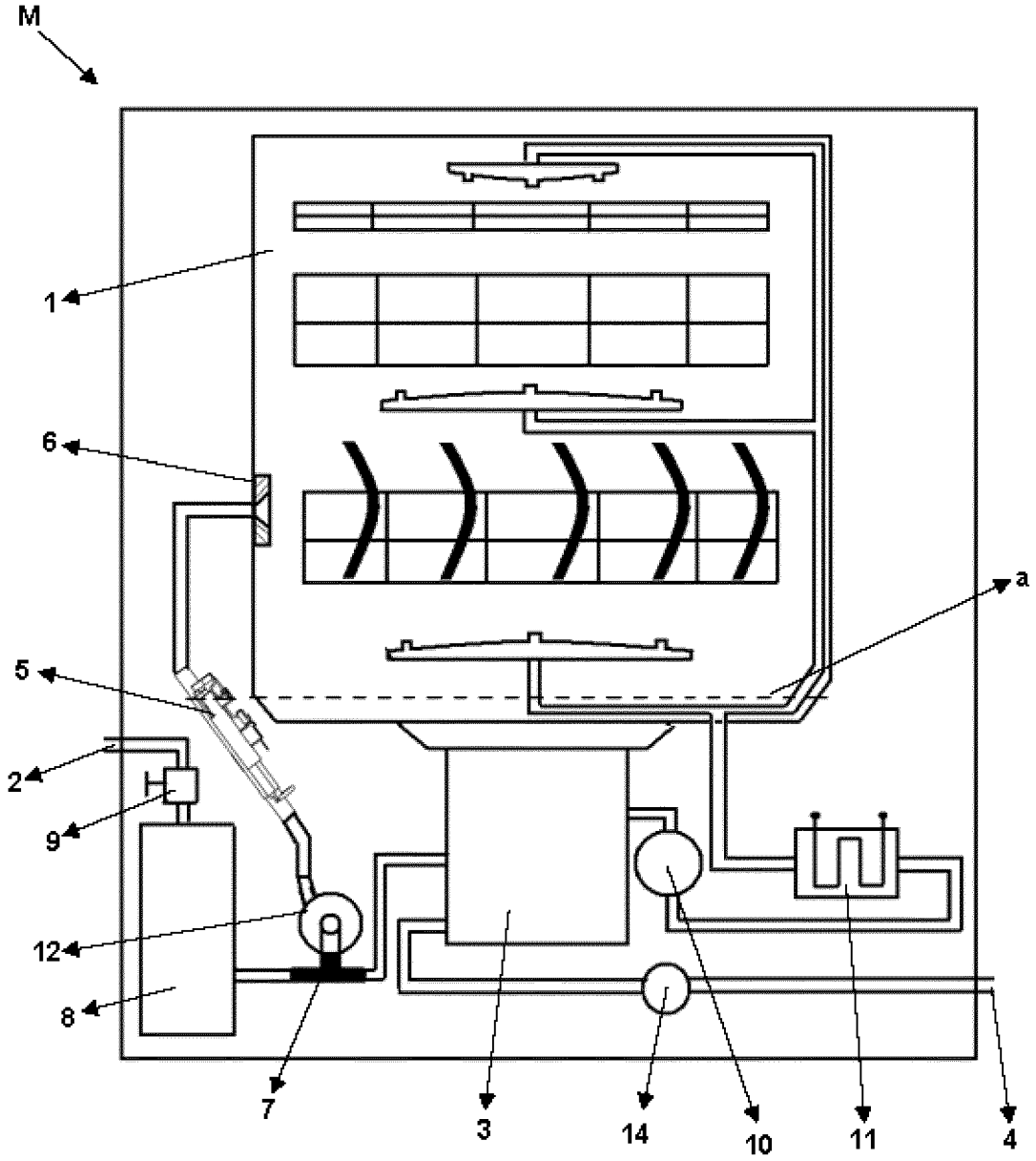

Figure – 3

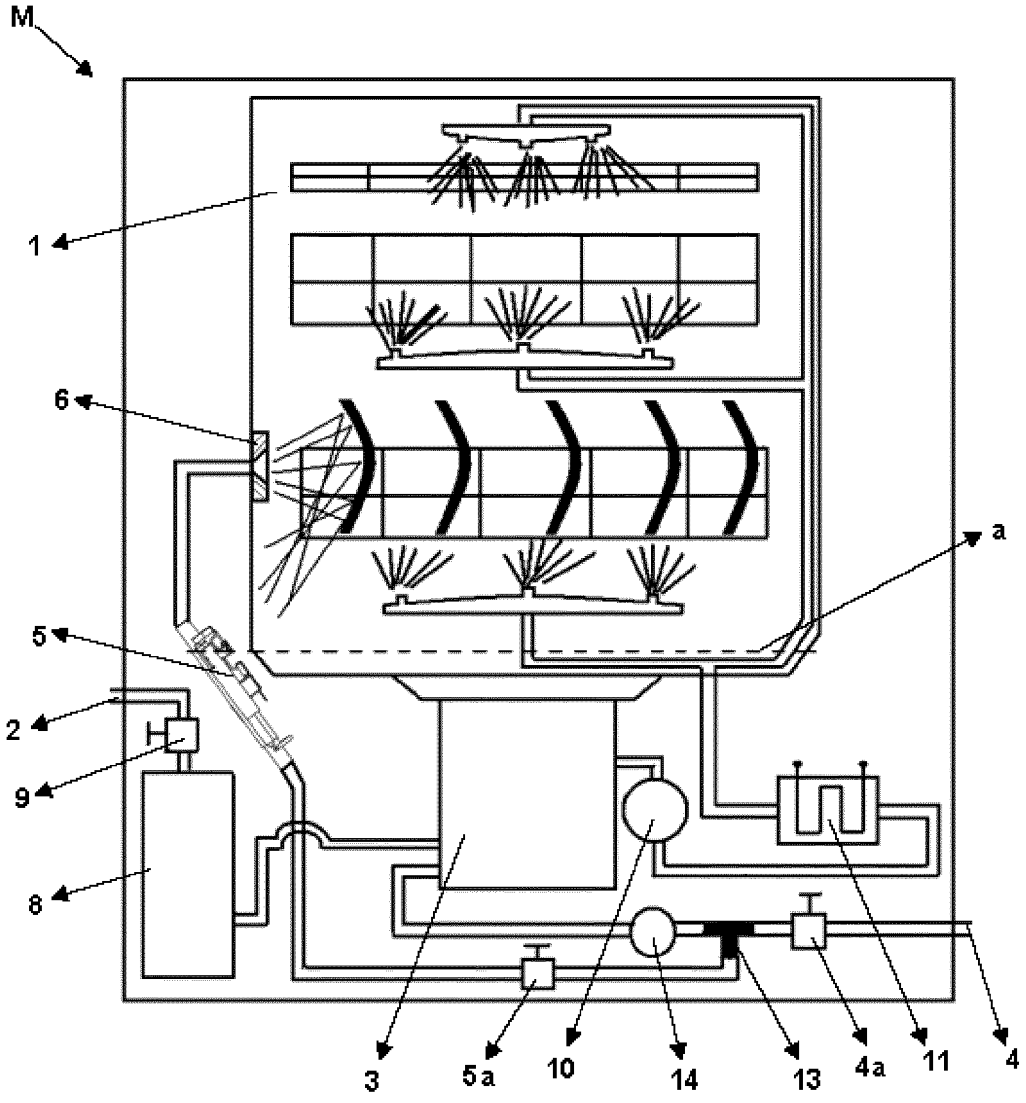

Figure – 4

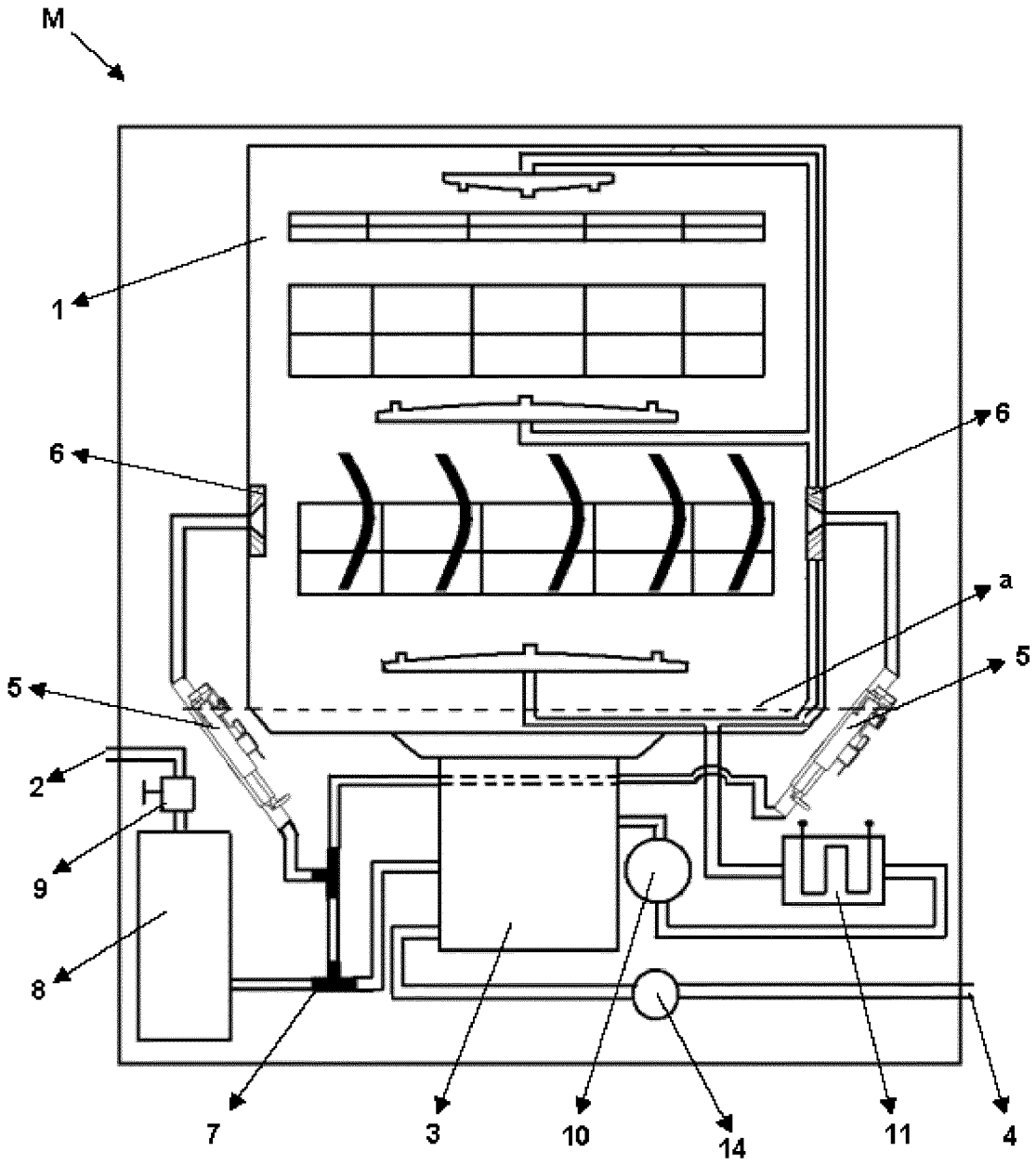

Figure – 5

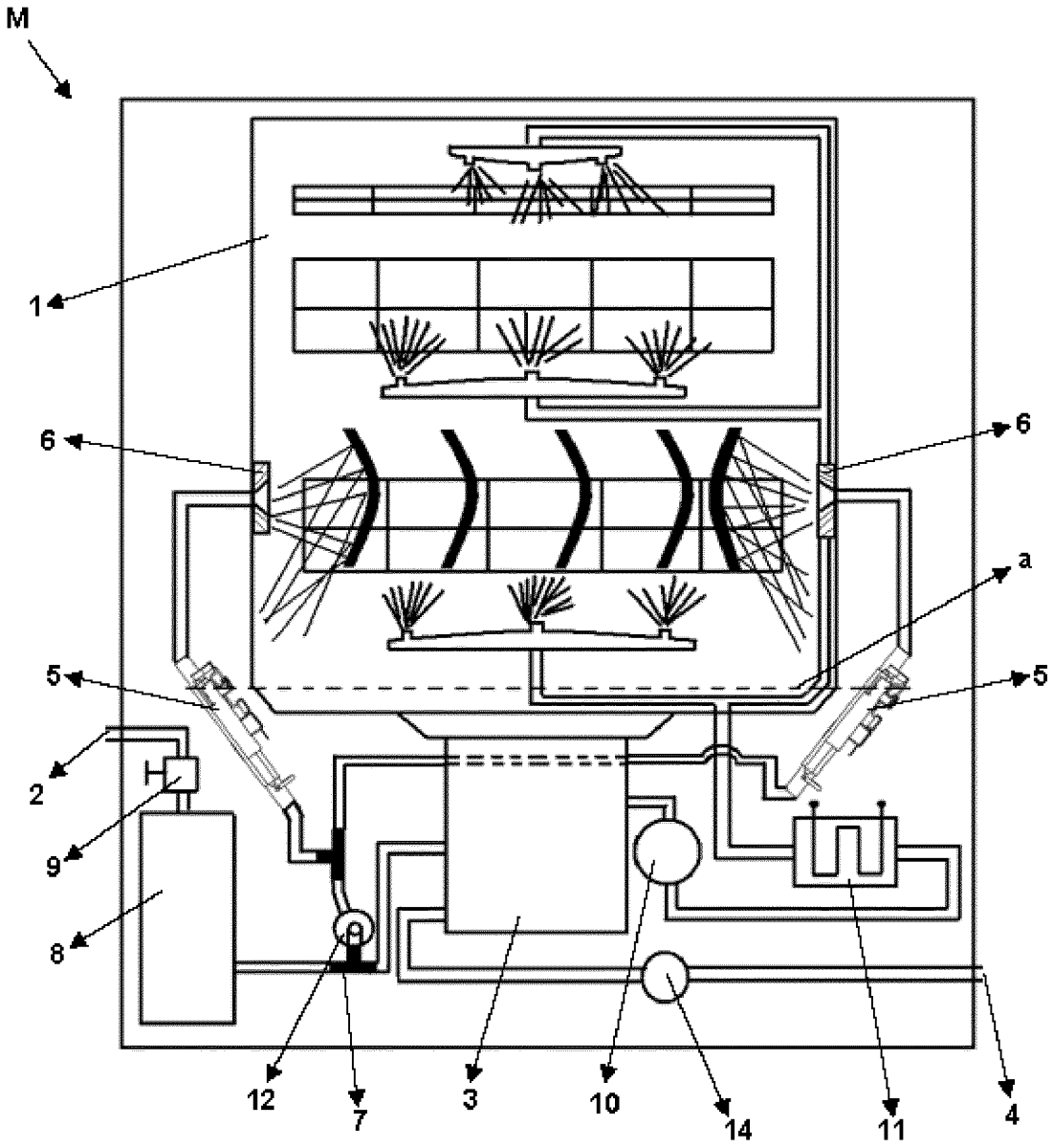

Figure – 6

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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- EP 2031116 A1 **[0004]**
- US 2008236624 A1 **[0005]**