



(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
21.02.2018 Bulletin 2018/08

(51) Int Cl.:
D06F 39/08 (2006.01)

(21) Application number: **16779527.7**

(86) International application number:
PCT/CN2016/077491

(22) Date of filing: **28.03.2016**

(87) International publication number:
WO 2016/165552 (20.10.2016 Gazette 2016/42)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

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(30) Priority: **15.04.2015 CN 201510177345**

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(54) **DEVICE FOR PREVENTING SPRAY PIPE ORIFICE OF ROLLER WASHING MACHINE FROM DRIPPING WATER, AND ROLLER WASHING MACHINE**

(57) A device for preventing water leakage at end of the spray pipe in drum washing machine is provided to solve the technical problem of residual water in the spray pipe (3) after washing of the drum washing machine is ended. The device comprises a faucet (5), a water inlet valve (1), a spray pipe (3), a detergent tank (6) and a spray device (4), wherein the water inlet valve (1) is connected to the faucet (5); the water inlet valve (1) is provided with a solenoid valve (2); the water inlet end of the spray pipe (3) is connected to the solenoid valve (2); the water outlet end of the spray pipe (3) is connected to the spray device (4); and the spray pipe (3) and the detergent tank (6) are connected by means of a channel. Because the detergent tank (6) is communicated with the atmosphere, the spray pipe (3) is communicated with the air by means of the channel. As the spraying finished and the solenoid valve (2) is closed, the inside pressure of the spray pipe (3) is balanced with the atmosphere, thereby residual water in the spray pipe (3) could be drained out.

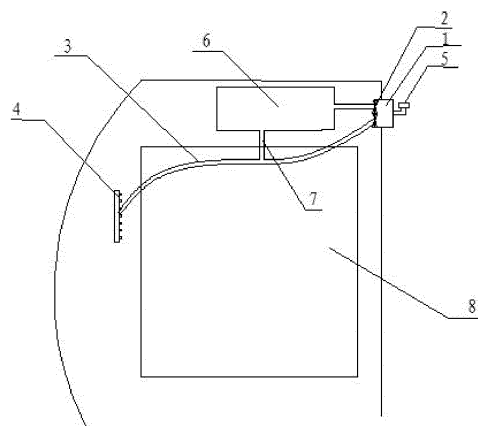


FIG. 2

Description

Technical Field

[0001] The present invention relates to the field of washing machine, and more particularly, to a device preventing water leakage at ends of spray pipe in drum washing machine and a drum washing machine comprising the device.

Background

[0002] The drum washing machine is used to wash laundry by rotating the drum. After the washing procedure, foam or other substances produced during cleaning are left in the drum or attached to the viewing window. In order to rinse the inside of the drum and the viewing window, a sprinkler system is typically provided.

[0003] As shown in Fig. 1, the sprinkler system is typically provided on the top of the drum, which includes a water inlet valve 1, a solenoid valve 2, a spray pipe 3 and a spray device 4 with a plurality of spray nozzles; wherein the water inlet valve 1 is connected to a faucet 5 to supply water for laundry; the water inlet valve 1 is further connected to the solenoid valve 2, the solenoid valve 2 is further connected to the water inlet end of the spray pipe 3, the water outlet end of the spray pipe 3 is connected to the spray device 4, and a plurality of spray nozzles of the spray device 4 are provided on the inner side wall of the drum 8, and also on the side of the viewing window. After the laundry, the solenoid valve 2 is opened and water flows into the spray device 4 through the spray pipe 3 and sprays out through the spray nozzles of the spray device 4, the inside of the drum 8 and the viewing window are rinsed with the sprayed water. The washing program ends once the rinsing is finished and the solenoid valve 2 is closed.

[0004] Once the solenoid valve 2 is closed, the inside of the drum forms an enclosed sealing space that further results in the spray pipe of the spray device is in a sealing status. Accordingly, water inside the spray pipe cannot be drained out. The next time when users open the door of washing machine to do laundry, the residual water in the spray pipe may leak out to the floor.

[0005] In order to solve the problem, the present invention provides a device for preventing water leakage of spray pipe in drum washing machine and a drum washing machine including the device.

Summary of the Invention

[0006] In order to solve the above technical problems, the following technical solution is provided.

[0007] Provided is a device for preventing water leakage at end of the spray pipe in drum washing machine, including a faucet, a water inlet valve, a spray pipe, a detergent tank and a spray device, wherein the water inlet valve is connected to the faucet; the water inlet valve

is provided with a solenoid valve; the water inlet end of the spray pipe is connected to the solenoid valve; the water outlet end of the spray pipe is connected to the spray device; and the spray pipe and the detergent tank are connected by means of a channel.

[0008] Further a section of the spray pipe is disposed outside the housing of the detergent tank; and the channel is formed by means of a one-way valve mounted between the spray pipe and the housing of the detergent tank.

[0009] Further a section of the spray pipe is disposed outside the housing of the detergent tank; and the channel is formed by means of a structure that the wall of the spray pipe is connecting to a vent hole opened on the housing of the detergent tank through a branch pipe.

[0010] Further the spray pipe passes through the inside of the detergent tank; and the channel is formed by a one-way valve mounted on the part of the spray pipe wall inside the detergent tank.

[0011] Further the spray pipe passes through the inside of the detergent tank; and the channel is formed by means of a vent hole opened on the part of the spray pipe wall inside the detergent tank.

[0012] Further a section of the spray pipe disposed outside of the detergent tank housing; and a section of the spray pipe wall is integrated with the detergent tank housing; the channel is formed by a vent hole opened on the section of the spray pipe wall integrated with the detergent tank housing.

[0013] Further a section of the spray pipe disposed outside of the detergent tank housing; and a section of the spray pipe wall is integrated with the detergent tank housing; the channel is formed by a one-way valve arranged on the section of the spray pipe wall integrated with the detergent tank housing.

[0014] Further a section of the spray pipe disposed inside of the detergent tank housing; and a section of the spray pipe wall is integrated with the detergent tank housing; the channel is formed by a one-way valve arranged on the non-integrated section of the spray pipe wall away from the detergent tank housing.

[0015] Further a section of the spray pipe disposed inside of the detergent tank housing; and a section of the spray pipe wall is integrated with the detergent tank housing; the channel is formed by a vent hole opened on the non-integrated section of the spray pipe wall away from the detergent tank housing.

[0016] The present invention further provides a drum washing machine comprising a device for preventing water leakage of spray pipe in drum washing machine, the device comprising a faucet, a water inlet valve, a spray pipe, a detergent tank and a spray device, wherein the water inlet valve is connected to the faucet; the water inlet valve is provided with a solenoid valve; the water inlet end of the spray pipe is connected to the solenoid valve; the water outlet end of the spray pipe is connected to the spray device; and the spray pipe and the detergent tank are connected to a channel.

[0017] Compared with the prior art, the advantages and the positive effects of the present invention are: by means of the channel between the spray pipe and the detergent tank communicated with the atmosphere, the spray pipe communicates with the atmosphere as well. As the solenoid valve closed after the washing procedure, residual water caused by the sealed internal space leaving in the spray pipe will suffer atmosphere pressure and flow out to the drum because the spray pipe communicates with the atmosphere, accordingly there will be no water leaking out on the floor when users open the door next time, thereby improving user experience.

Description of the drawings

[0018]

Figure 1 is a schematic view showing the traditional sprinkler system of a drum washing machine;

Figure 2 is a schematic view showing the device for preventing water leakage at end of the spray pipe in drum washing machine of the present invention;

Figure 3 is a schematic view showing the device for preventing water leakage at end of the spray pipe in drum washing machine according to an embodiment of the present invention;

Figure 4 is a schematic view showing the device for preventing water leakage at end of the spray pipe in drum washing machine according to an embodiment of the present invention;

Figure 5 is a schematic view showing the device for preventing water leakage at end of the spray pipe in drum washing machine according to an embodiment of the present invention;

Figure 6 is a schematic view showing the device for preventing water leakage at end of the spray pipe in drum washing machine according to an embodiment of the present invention;

Figure 7 is a schematic view showing the device for preventing water leakage at end of the spray pipe in drum washing machine according to an embodiment of the present invention;

Figure 8 is a schematic view showing the device for preventing water leakage at end of the spray pipe in drum washing machine according to an embodiment of the present invention;

Figure 9 is a schematic view showing the device for preventing water leakage at end of the spray pipe in drum washing machine according to an embodiment of the present

invention;

Figure 10 is a schematic view showing the device for preventing water leakage at end of the spray pipe in drum washing machine according to an embodiment of the present invention;

Fig. 11 is a schematic view showing the device for preventing water leakage at end of the spray pipe in drum washing machine according to an embodiment of the present invention.

Detailed description of the preferred embodiments

[0019] Hereinafter, specific embodiments of the present invention will be described in further detail with reference to the accompanying drawings.

[0020] As shown in Fig. 2, it is a schematic view showing the device for preventing water leakage at end of the spray pipe in drum washing machine. The device comprises a faucet 5, a water inlet valve 1, a spray pipe 3, a detergent tank 6 and a spray device 4; wherein the water inlet valve 1 is provided with a solenoid valve 2; the water inlet end of the spray pipe 3 is connected to a solenoid valve; the water outlet end of the spray pipe 3 is connected to the spray device 4; and the spray pipe 3 and the detergent tank 7 are connected by means of a channel 7.

[0021] By means of the channel 7 between the spray pipe 3 and the detergent tank 6 communicated with the atmosphere, the spray pipe 3 communicates with the atmosphere as well. As the solenoid valve 2 closed after the washing procedure, residual water caused by the sealed internal space leaving in the spray pipe 3 will suffer atmosphere pressure and flow out to the drum because the spray pipe 3 communicates with the atmosphere. There will be no residual water in the spray pipe 3 and will be no residual water leaking out on the floor when users open the door next time, thereby improving user experience.

[0022] After the washing procedure, the solenoid valve 2 connected to the sprinkler pipe 3 is opened, and water from the faucet 5 flows to the spray pipe 3, and then into the spray device 4, and the inside of the drum and the viewing window are rinsed with water sprayed by the spray device 4. During the spray process, the water flows into the spray pipe 3, and the water is also introduced into the channel 7. But as long as the channel 7 is designed to be thinner or smaller than the spray pipe 3, the amount of water in the channel 7 could be negligible. The water in the channel 7 may flow into the detergent tank 6 because they are communicated with, and then flow to the drum through the detergent tank 6.

[0023] The form of the channel could be various and is not limited in the present invention. However, it should be ensured that the spray pipe 3 is communicated with the detergent tank 6 allowing air passing through, thus the spray pipe 3 is communicated with the atmosphere through the detergent tank 6.

[0024] Hereinafter, several embodiments are provided to illustrate the device preventing water leakage of spray pipe in drum washing machine of the present invention in detail.

[0025] As shown in Fig. 3, a section of the spray pipe 3 is provided outside the housing of the detergent tank 6, selectively on the upper side, on the lower side, on the left side or on the right side. In this embodiment, the channel 7 is formed by means of a one-way valve disposed between the spray pipe 3 and the housing of the detergent tank 6. To be specific, a vent hole 71 is opened on the housing of the detergent tank 6. The end A of the one-way valve 7 is arranged on the pipe wall of the spray pipe 3 and the end P of the one-way valve 7 passes through the vent hole 71 on the detergent tank housing. After the washing procedure, the solenoid valve 2 is opened, and the inside of the drum, as well as the viewing window are rinsed by the sprayed water, force due to water flow exerts on the one-way valve port to close it, further shut off the air flow between the end A and the end P; when the spray step finishes and the solenoid valve 2 is closed, the interior pressure of the spray pipe 3 drops so that the valve port of the one-way valve 7 is opened, air flows from the end P to the end A, and eventually flows into the spray pipe 3. Accordingly, the interior pressure of the spray pipe 3 and the exterior pressure outside the pipe end is balanced, thereby the residual water in the spray pipe 3 could exhaust.

[0026] As shown in Fig. 4, a section of the spray pipe 3 is located outside of the housing of the detergent tank 6, selectively on the upper side, on the lower side, on the left side or on the right side. The channel 7 is formed by means of a structure as follows. Specifically, a vent hole 71 is opened on the housing of the detergent tank 6, a branch pipe 72 thinner than the spray pipe 3 is provided on the pipe wall of the spray pipe 3, and thus the branch pipe 72 is communicated with the vent hole 71 to build on the channel between the spray pipe 3 and the detergent tank 6. After the washing procedure, the solenoid valve 2 is opened, and the inside of the drum, as well as the viewing window are rinsed by the sprayed water. During the spray process, on one hand, a small part of water flows to the vent hole 71 from the branch pipe 72, and then to the detergent tank 6, and eventually flows into the drum, on the other hand most water flows from the spray pipe 3 to the spray device 4 for spray. When the spray step finishes and the solenoid valve 2 is closed, the interior of the spray pipe 3 is communicated with the detergent tank 6 via the channel, so that the pressure is balanced due to the fact that the detergent tank 6 is communicated with the atmosphere, and then the residual water flows out from the spray pipe.

[0027] As shown in Fig. 5, the spray pipe 3 passes through the inside of the detergent tank 6. The channel 7 is a one-way valve disposed on the pipe wall of the part of the spray pipe 3 inside the detergent tank 6. The end A of the one-way valve is arranged facing to the wall of the spray pipe. After the washing procedure, the solenoid

valve 2 is opened, and the inside of the drum, as well as the viewing window are cleaned by the sprayed water, force due to water flow exerts on the one-way valve port to close it, further shut off the air flow between the end A and the end P; when the spray step finishes and the solenoid valve 2 is closed, the interior pressure of the spray pipe 3 drops so that the valve port of the one-way valve 7 is opened, air flows from the end P to the end A, and eventually flows into the spray pipe 3. Accordingly, the interior pressure of the spray pipe 3 and the exterior pressure outside the pipe end are balanced, so that the residual water in the spray pipe 3 could be drained out.

[0028] As shown in Fig. 6, the spray pipe 3 passes through the inside of the detergent tank 6. The channel 7 is formed by means of a structure that a vent hole 71 is opened on the pipe wall of the part of the spray pipe 3 inside the detergent tank 6. After the washing procedure, the solenoid valve 2 is opened, and the inside of the drum, as well as the viewing window are rinsed by the sprayed water. During the spray process, on one hand, a small part of water flows into the detergent tank 6 via the vent hole 71, and eventually flows into the drum, on the other hand most water flows from the spray pipe 3 to the spray device 4 for spray. When the spray step finishes and the solenoid valve 2 is closed, the interior of the spray pipe 3 is communicated with the detergent tank 6 via the vent hole 71, so that the pressure is balanced due to the fact that the detergent tank 6 is communicated with the atmosphere, and then the residual water flows out from the spray pipe.

[0029] As shown in Fig. 7, a section of the spray pipe 3 is disposed outside of the detergent tank 6 and integrated with the detergent tank, and part of the wall of the spray pipe is integrated with the housing of the detergent tank 3. The channel 7 is formed by means of a structure that a vent hole 71 is opened on the part of the wall of the spray pipe integrated with the housing of the detergent tank 3. After the washing procedure, the solenoid valve 2 is opened, and the inside of the drum, as well as the viewing window are rinsed by the sprayed water. During the spray process, on one hand, a small part of water flows to the detergent tank 6 via the vent hole 71, and eventually flows into the drum, on the other hand most water flows from the spray pipe 3 to the spray device 4 for spray. When the spray step finishes and the solenoid valve 2 is closed, the interior of the spray pipe 3 is communicated with the detergent tank 6 via the channel, so that the pressure is balanced due to the fact that the detergent tank 6 is communicated with the atmosphere, and then the residual water flows out from the spray pipe.

[0030] As shown in Fig. 8, a section of the spray pipe 3 is disposed outside of the housing of the detergent tank 6 and is integrated with the detergent tank 6, and a part of the pipe wall of the spray pipe 3 is integrated with the housing of the detergent tank 6. The channel 7 is formed by means of a one-way valve arranged on the part of the spray pipe wall integrated with the detergent tank housing, the end P of the one-way valve is arranged facing

the interior of the housing of the detergent tank 6 and the end A is arranged facing the pipe wall of the spray pipe. After the washing procedure, the solenoid valve 2 is opened, and the inside of the drum, as well as the viewing window are rinsed by the sprayed water, force due to water flow exerts on the one-way valve port to close it, further shut off the air flow between the end A and the end P; when the spray step finishes and the solenoid valve 2 is closed, the interior pressure of the spray pipe 3 drops so that the valve port of the one-way valve 7 is opened, air flows from the end P to the end A, and eventually flows into the spray pipe 3. Accordingly, the interior pressure of the spray pipe 3 and the exterior pressure outside the pipe end are balanced, so that the residual water in the spray pipe 3 could be drained out.

[0031] As shown in Fig. 9, a section of the spray pipe 3 is disposed inside of the housing of the detergent tank 6 and is integrated with the detergent tank 6, and a part of the pipe wall of the spray pipe 3 is integrated with the housing of the detergent tank 6. The channel 7 is formed by means of a one-way valve arranged on the non-integrated part of the pipe wall of the spray pipe 3 away from the housing of the detergent tank 6, and the end A is arranged facing the spray pipe wall. After the washing procedure, the solenoid valve 2 is opened, and the inside of the drum, as well as the viewing window are rinsed by the sprayed water, force due to water flow exerts on the one-way valve port to close it, further shut off the air flow between the end A and the end P; when the spray step finishes and the solenoid valve 2 is closed, the interior pressure of the spray pipe 3 drops so that the valve port of the one-way valve 7 is opened, air flows from the end P to the end A, and eventually flows into the spray pipe 3. Accordingly, the interior pressure of the spray pipe 3 and the exterior pressure outside the pipe end are balanced, so that the residual water in the spray pipe 3 could be drained out.

[0032] As shown in Fig. 10, a section of the spray pipe 3 is disposed inside of the housing of the detergent tank 6 and is integrated with the detergent tank 6, and a part of the pipe wall of the spray pipe 3 is integrated with the housing of the detergent tank 6, and the channel 7 is formed by the structure that a vent hole 71 is opened on the non-integrated part of the pipe wall of the spray pipe 3 away from the housing of the detergent tank 6. After the washing procedure, the solenoid valve 2 is opened, and the inside of the drum, as well as the viewing window are rinsed by the sprayed water. During the spray process, on one hand, a small part of water flows to the detergent tank 6 through the vent hole 71, and eventually flows into the drum, on the other hand most water flows from the spray pipe 3 to the spray device 4 for spray. When the spray step finishes and the solenoid valve 2 is closed, the interior of the spray pipe 3 is communicated with the detergent tank 6 via the channel, so that the pressure is balanced due to the fact that the detergent tank 6 is communicated with the atmosphere, and then the residual water flows out from the spray pipe.

[0033] Based on the embodiments illustrated in Fig. 9 and Fig. 10, as well as the status as shown in the Fig. 11, it is featured that a section of the spray pipe 3 passes through the housing of the detergent tank 6 and is integrated with the housing where the channel is formed by means of a one-way valve disposed inside the housing of the detergent tank, or by means of a vent hole opened inside the housing of the detergent tank 6.

[0034] In the embodiments, one or more vent holes or one or more one-way valves could be provided.

[0035] The present invention also provides a drum washing machine comprising any of the devices for preventing water leakage of spray pipe in drum washing machine as described in various embodiments above.

[0036] According to the embodiments of the present invention, a device for preventing water leakage of spray pipe in the drum washing machine and a drum washing machine comprises the same are provided. The device provides a channel between the spray pipe of the drum washing machine and the detergent tank communicating with the atmosphere so that the spray pipe is communicated with the atmosphere as well. After the washing procedure, the solenoid valve is closed and the spray pipe is communicated with the atmosphere via the channel so that the residual water in the spray pipe suffers atmosphere and flows out. The next time when users open the door, there will be no water leaking out on the floor because no water residing in the spray pipe, thereby enhancing user experience.

[0037] It should be noted that the foregoing description is not to be construed as limitation of the invention. The invention also should not be limited is the above-described embodiments. Changes, modifications, additions or substitutions made by one of ordinary skill in the art should be regarded within the spirit and scope of the invention.

Claims

1. A device for preventing water leakage at end of the spray pipe in drum washing machine, including a faucet, a water inlet valve, a spray pipe, a detergent tank and a spray device, wherein the water inlet valve is connected to the faucet; the water inlet valve is provided with a solenoid valve; the water inlet end of the spray pipe is connected to the solenoid valve; the water outlet end of the spray pipe is connected to the spray device; and the spray pipe and the detergent tank are connected by means of a channel.
2. The device for preventing water leakage at end of the spray pipe in drum washing machine according to claim 1, wherein a section of the spray pipe is disposed outside the housing of the detergent tank; and the channel is formed by means of a one-way valve mounted between the spray pipe and the housing of the detergent tank.

3. The device for preventing water leakage at end of the spray pipe in drum washing machine according to claim 1, wherein a section of the spray pipe is disposed outside the housing of the detergent tank; and the channel is formed by means of a structure that the wall of the spray pipe is connecting to a vent hole opened on the housing of the detergent tank through a branch pipe. 5
4. The device for preventing water leakage at end of the spray pipe in drum washing machine according to claim 1, wherein the spray pipe passes through the inside of the detergent tank; and the channel is formed by a one-way valve mounted on the part of the spray pipe wall inside the detergent tank. 10 15
5. The device for preventing water leakage at end of the spray pipe in drum washing machine according to claim 1, wherein the spray pipe passes through the inside of the detergent tank; and the channel is formed by means of a vent hole opened on the part of the spray pipe wall inside the detergent tank. 20
6. The device for preventing water leakage at end of the spray pipe in drum washing machine according to claim 1, wherein a section of the spray pipe disposed outside of the detergent tank housing; and a section of the spray pipe wall is integrated with the detergent tank housing; the channel is formed by a vent hole opened on the section of the spray pipe wall integrated with the detergent tank housing. 25 30
7. The device for preventing water leakage at end of the spray pipe in drum washing machine according to claim 1, wherein a section of the spray pipe disposed outside of the detergent tank housing; and a section of the spray pipe wall is integrated with the detergent tank housing; the channel is formed by a one-way valve arranged on the section of the spray pipe wall integrated with the detergent tank housing. 35 40
8. The device for preventing water leakage at end of the spray pipe in drum washing machine according to claim 1, wherein a section of the spray pipe disposed inside of the detergent tank housing; and a section of the spray pipe wall is integrated with the detergent tank housing; the channel is formed by a one-way valve arranged on the non-integrated section of the spray pipe wall away from the detergent tank housing. 45 50
9. The device for preventing water leakage at end of the spray pipe in drum washing machine according to claim 1, wherein a section of the spray pipe disposed inside of the detergent tank housing; and a section of the spray pipe wall is integrated with the detergent tank housing; the channel is formed by a vent hole opened on the non-integrated section of the spray pipe wall away from the detergent tank housing. 55
10. A drum washing machine, including the device for preventing water leakage at end of the spray pipe in drum washing machine according to any one of claim 1 to claim 9.

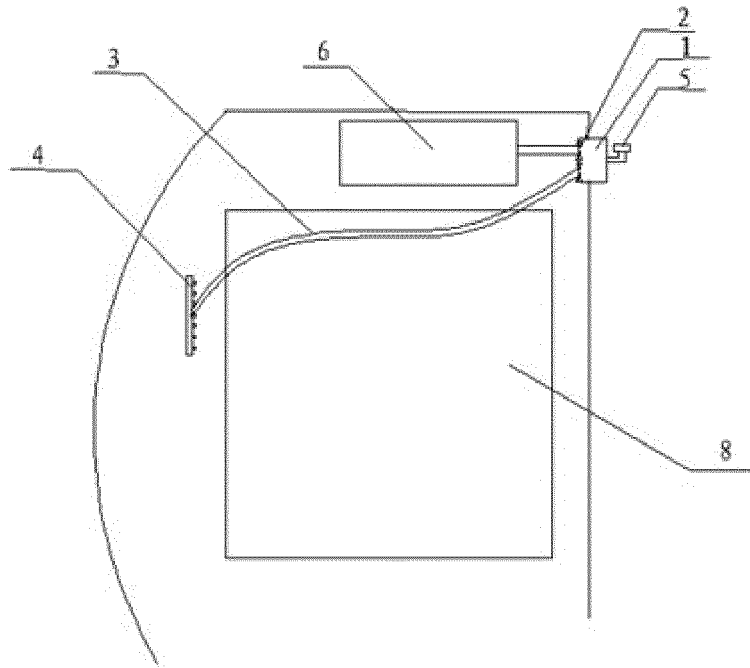


FIG. 1

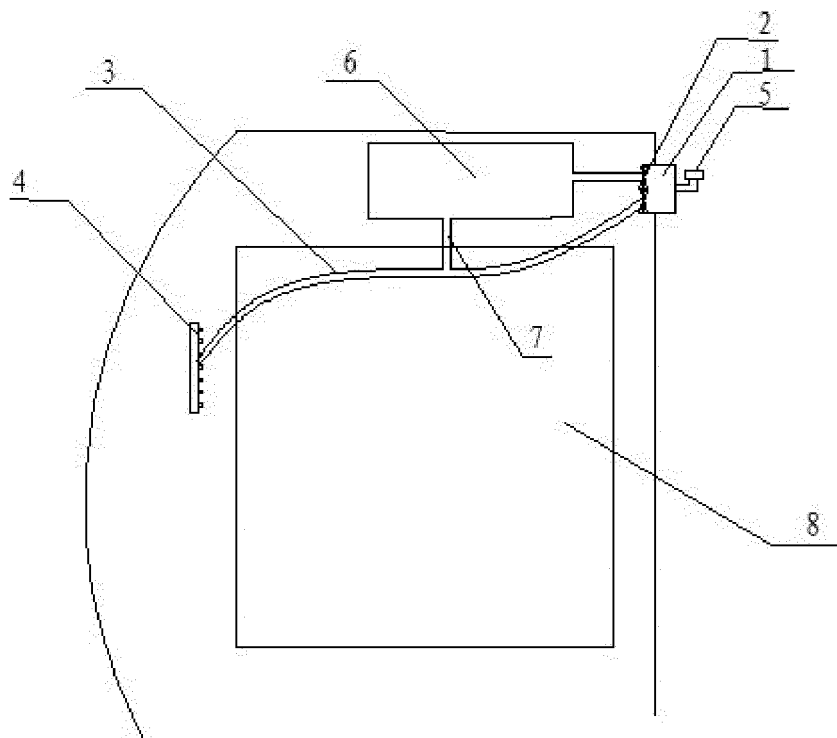


FIG. 2

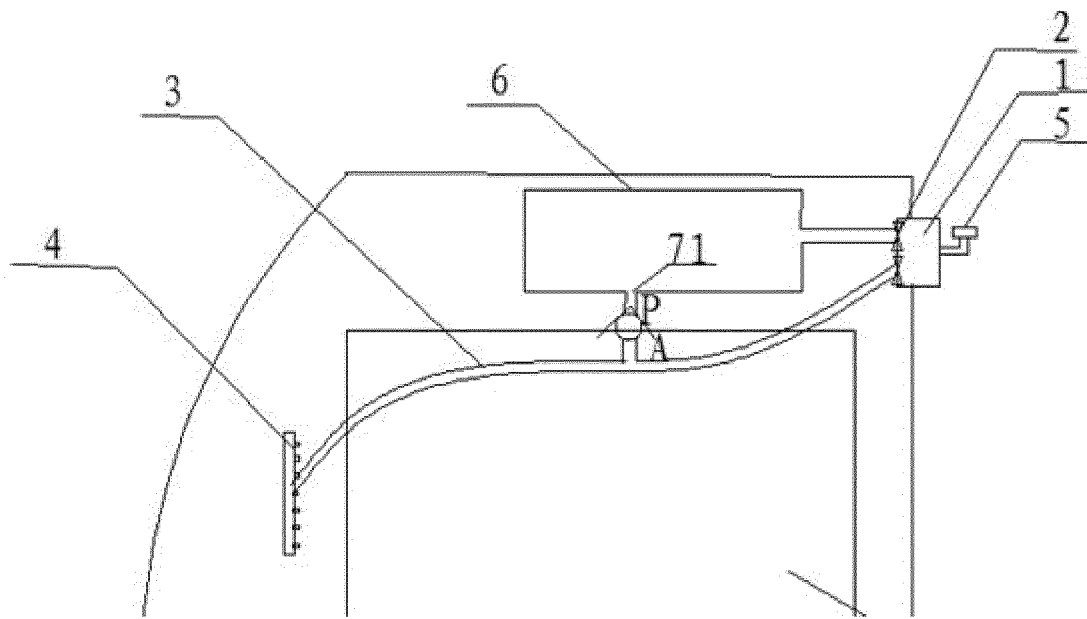


FIG. 3

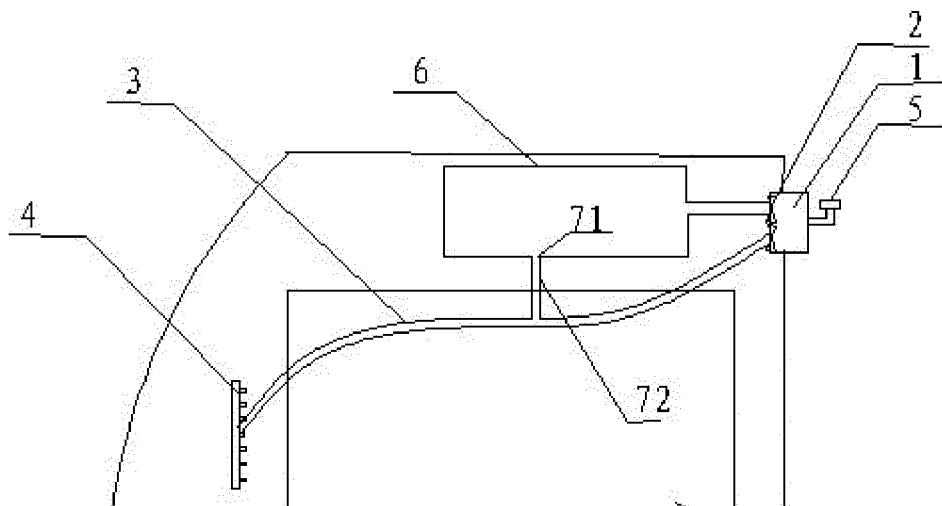


FIG. 4

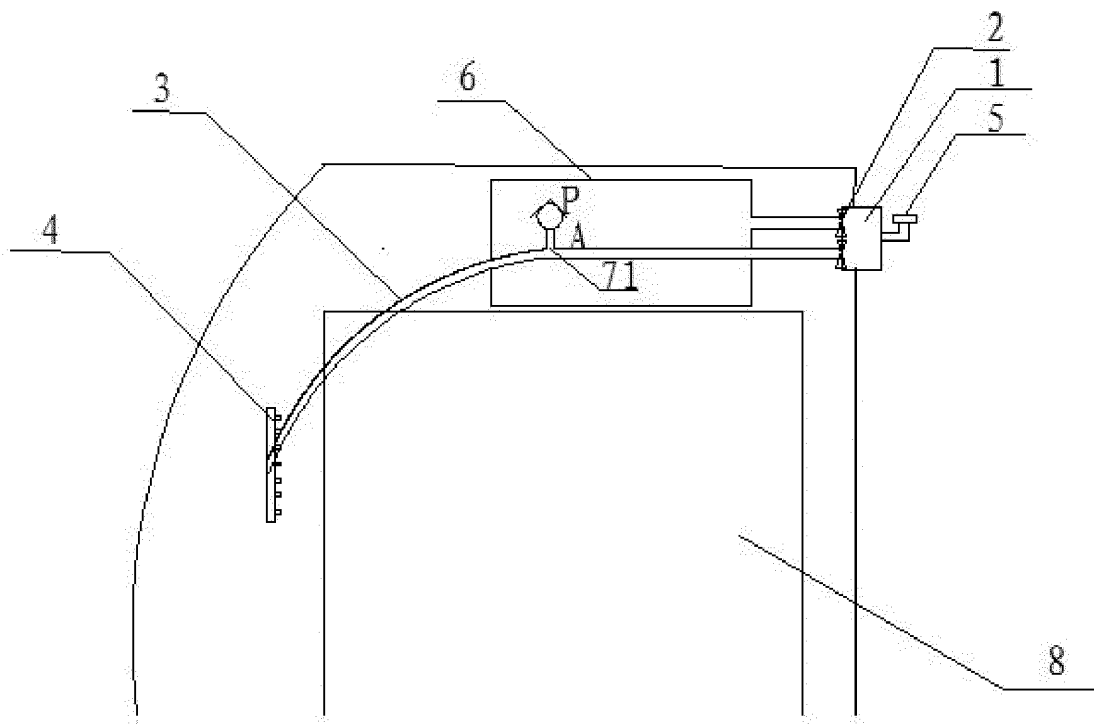


FIG. 5

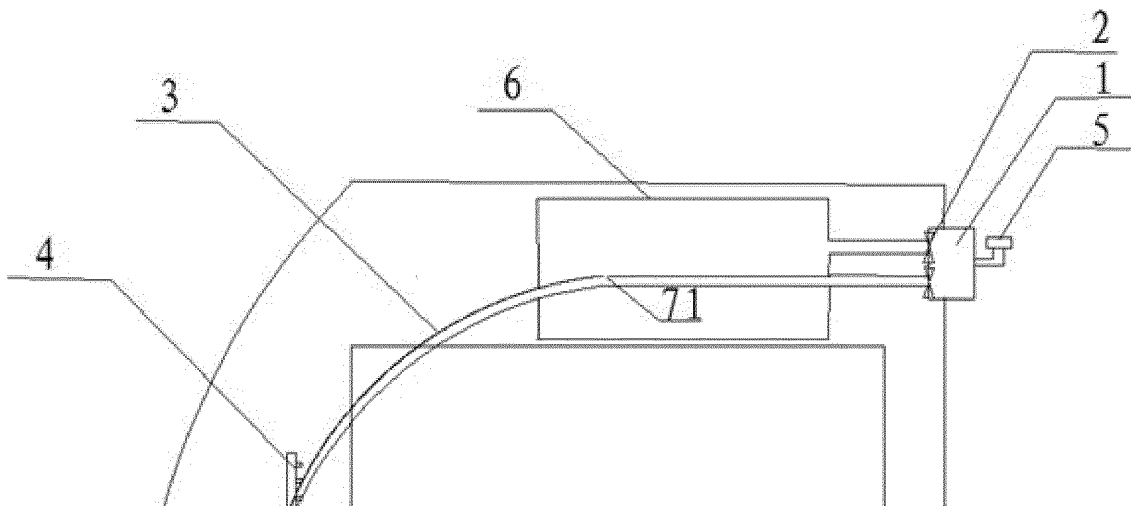


FIG. 6

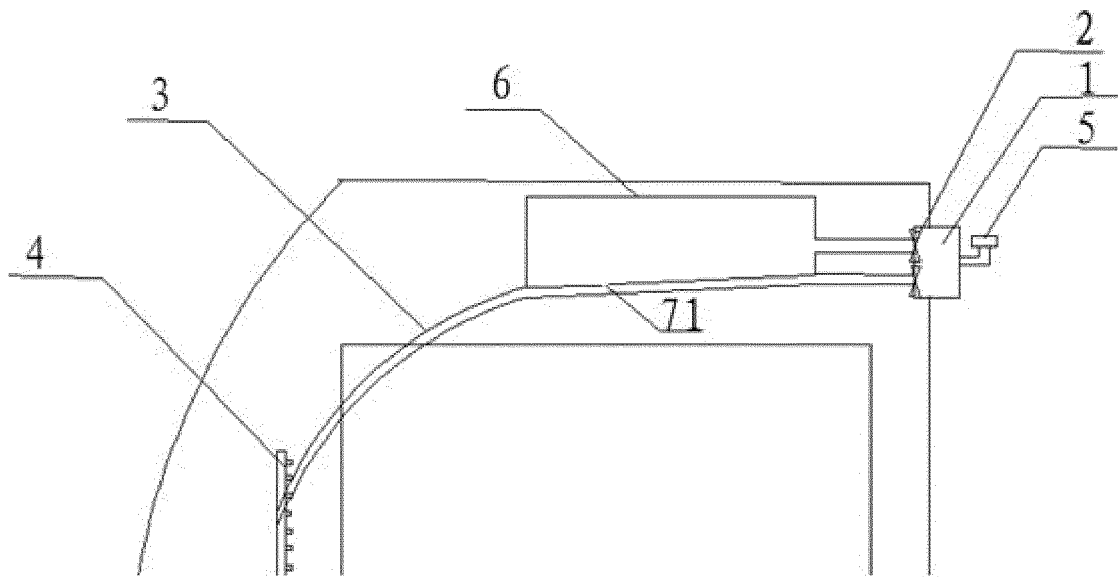


FIG. 7

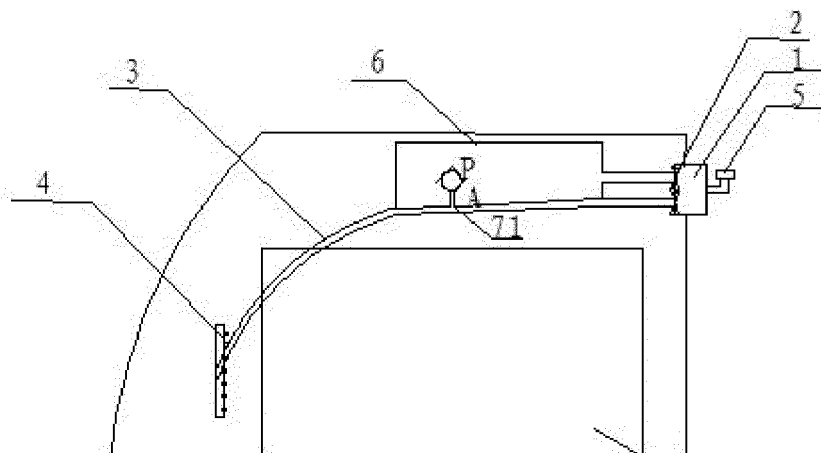


FIG. 8

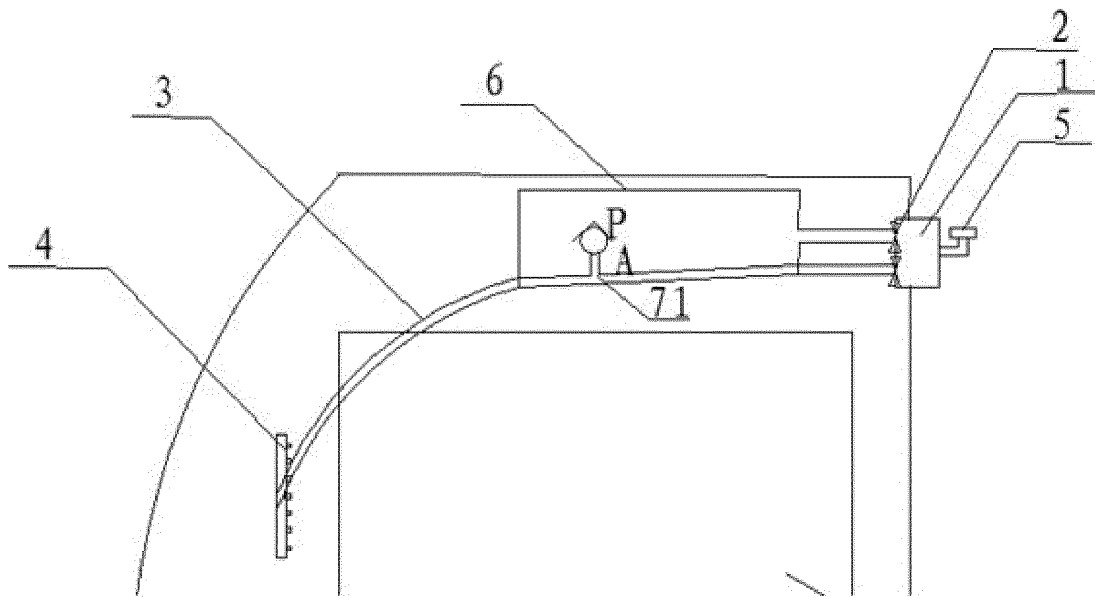


FIG. 9

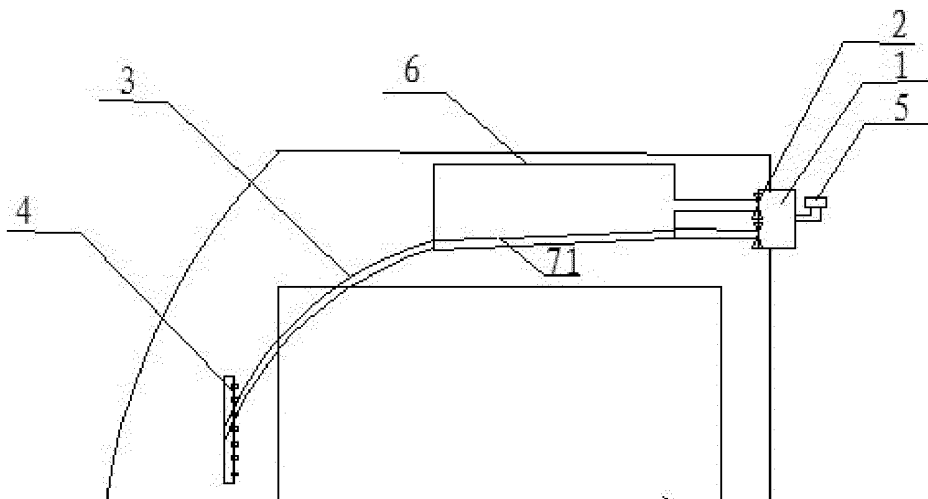


FIG. 10

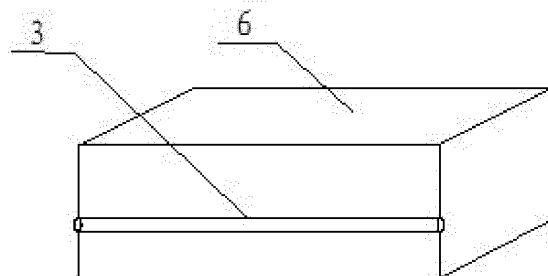


FIG. 11

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2016/077389

A. CLASSIFICATION OF SUBJECT MATTER

D06F 39/08 (2006.01) i

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)

CNTXT, CNABS, EPODOC, WPI: spray+, jet+, inject+, pipe, tube, channel, passage, detergent, agent, box, case, container, distributor, connect+.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 201037211 Y (PANASONIC HOUSING EQUIPMENT HA) 19 March 2008 (19.03.2008) description, page 5, lines 6-14, and figure 1	1-10
A	CN 201762574 U (WANG HUANJIANG) 16 March 2011 (16.03.2011) the whole document	1-10
A	JP 2013009810 A (PANASONIC CORP.) 17 January 2013 (17.01.2013) the whole document	1-10
A	JP 09308796 A (SANYO ELECTRIC CO) 02 December 1997 (02.12.1997) the whole document	1-10

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"E" earlier application or patent but published on or after the international filing date	"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
"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)	"&" document member of the same patent family
"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	

Date of the actual completion of the international search 26 June 2016	Date of mailing of the international search report 04 July 2016
Name and mailing address of the ISA State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No. (86-10) 62019451	Authorized officer GUO,Xu Telephone No. (86-10) 62084600

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2016/077389

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 201037211 Y	19 March 2008	None	
CN 201762574 U	16 March 2011	None	
JP 2013009810 A	17 January 2013	None	
JP 09308796 A	02 December 1997	None	