US009677215B2

(12) **United States Patent**
Kim et al.

(10) **Patent No.: US 9,677,215 B2**
(45) **Date of Patent: Jun. 13, 2017**

(54) **LAUNDRY TREATING APPARATUS**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **14/920,148**

(22) Filed: **Oct. 22, 2015**

(65) **Prior Publication Data**

US 2016/0115639 A1 Apr. 28, 2016

(30) **Foreign Application Priority Data**

Oct. 28, 2014 (KR) 10-2014-0147788

(51) **Int. Cl.**

D06F 58/22	(2006.01)
D06F 58/26	(2006.01)
D06F 58/20	(2006.01)
D06F 58/24	(2006.01)

(52) **U.S. Cl.**

CPC ***D06F 58/22*** (2013.01); ***D06F 58/26*** (2013.01); *D06F 58/206* (2013.01); *D06F 58/24* (2013.01)

(58) **Field of Classification Search**

CPC F26B 19/00; F26B 21/00; F26B 21/06; D06F 58/22; D06F 58/26

USPC 34/595, 601, 610; 68/19, 20; 8/149, 159

See application file for complete search history.

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(57) **ABSTRACT**

A laundry treating apparatus is provided that may include a laundry accommodation device that provides a space in which laundry may be accommodated, the laundry accommodation device having an exhaust device that exhausts air and a supply device that supplies air; a circulation passage that guides air exhausted from the exhaust device to the supply device, the circulation passage having an inlet that communicates with the exhaust device; a heat exchanger provided in the circulation passage; a filter frame provided between the heat exchanger and the inlet; a filter fixed to the filter frame and provided in the circulation passage; and a filter washer fixed to the filter frame, that supplies washing water to the filter.

16 Claims, 11 Drawing Sheets

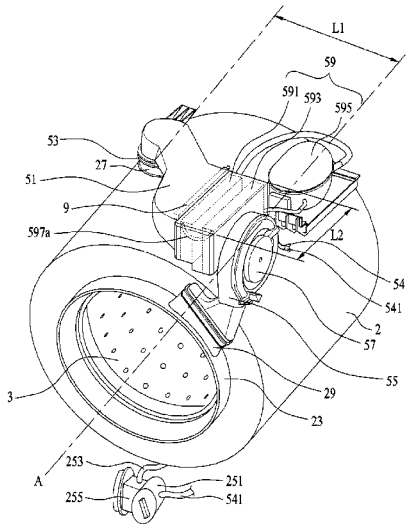

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FIG. 1

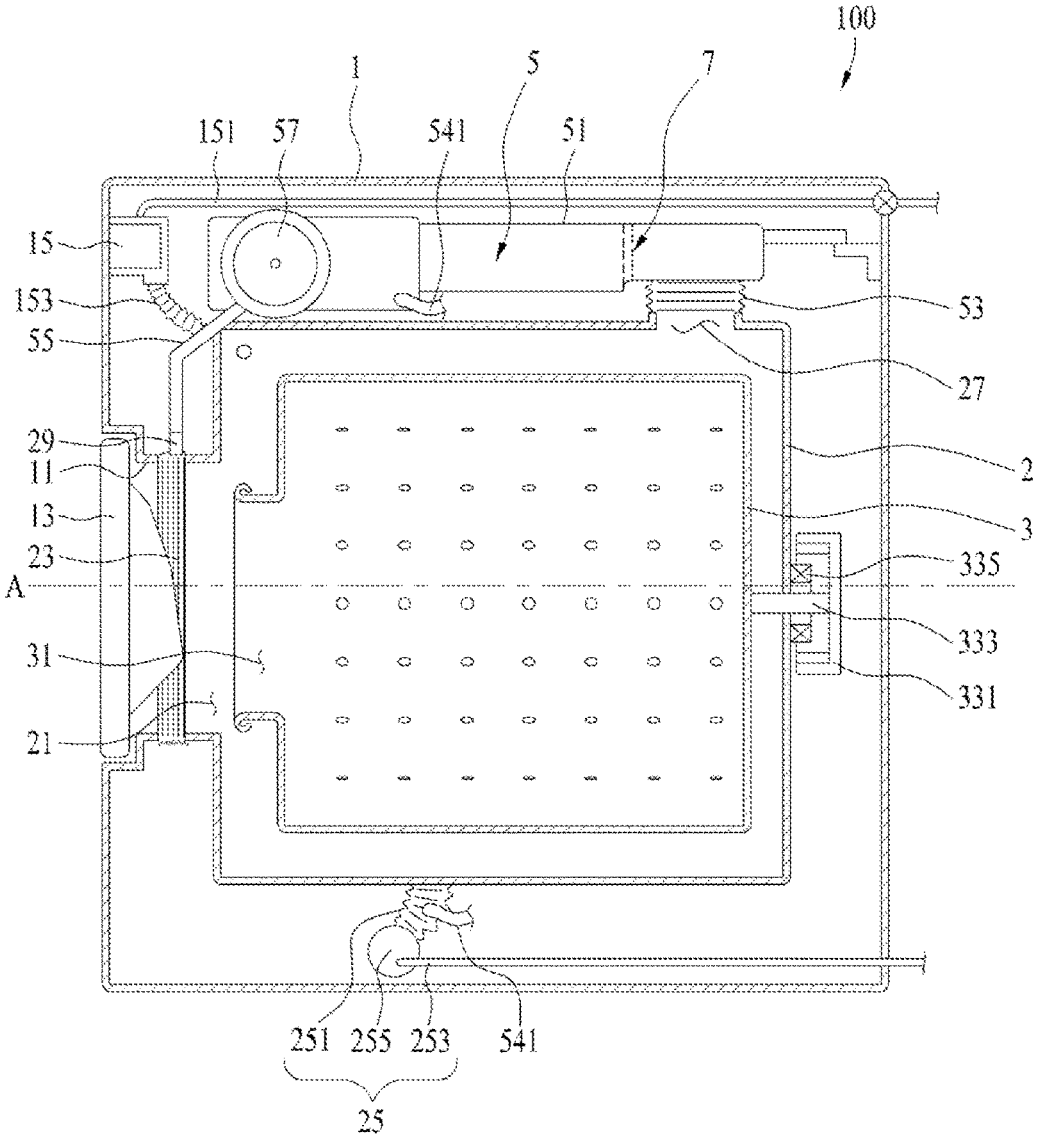

100
1
5
7
151
57
541
51
15
153
55
53
27
29
11
13
23
2
3
335
A
333
331
31
21
251
255
253
541
25

FIG. 2

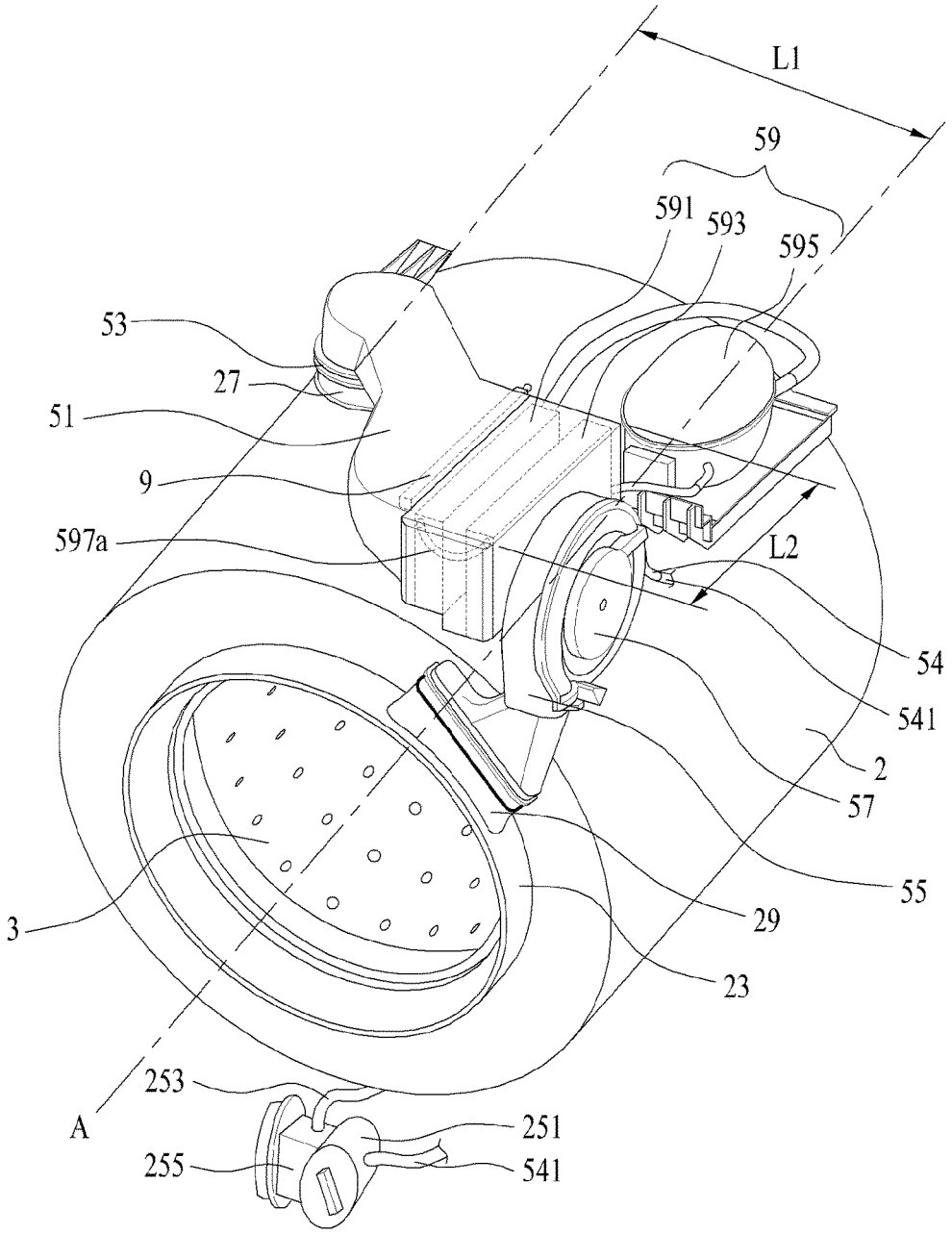

L1
59
591
593
595
53
27
51
9
597a
L2
54
541
2
57
55
29
23
3
253
A
251
255
541

FIG. 3

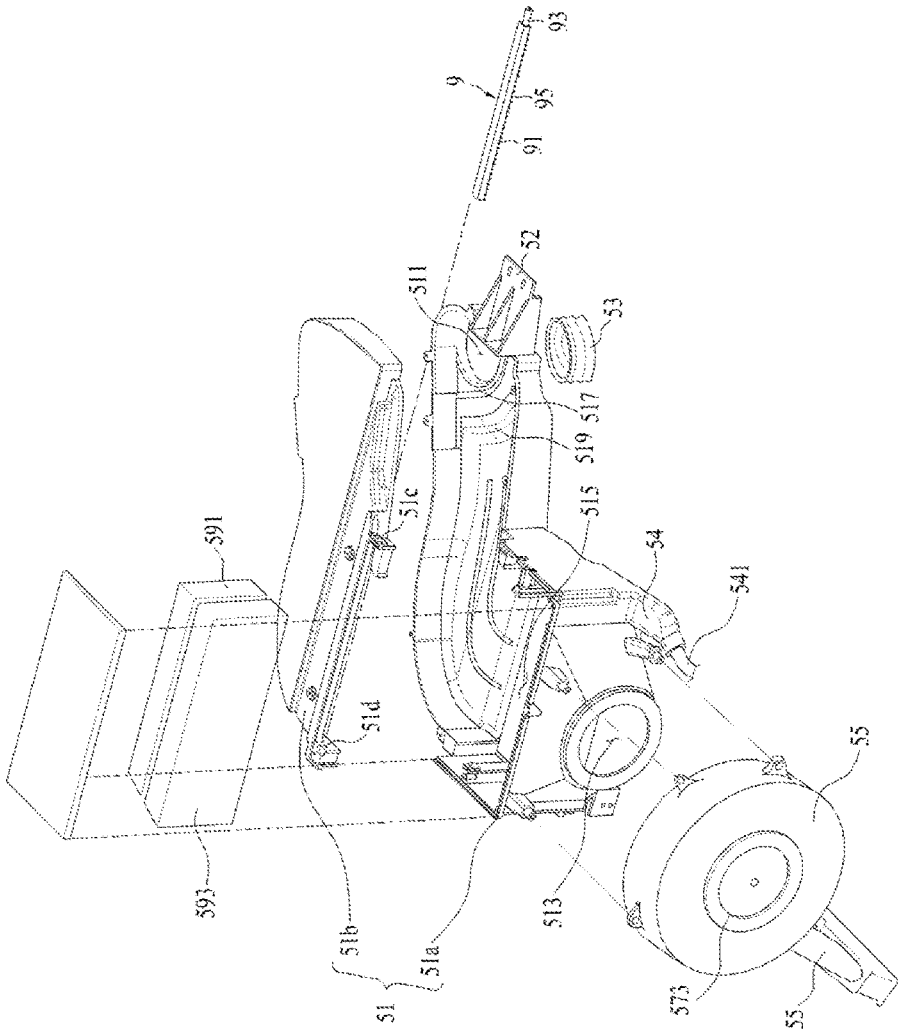

93
9
95
91
52
511
53
517
519
515
54
541
55
591
51c
51d
593
51b
51a
51
513
573
55

FIG. 4

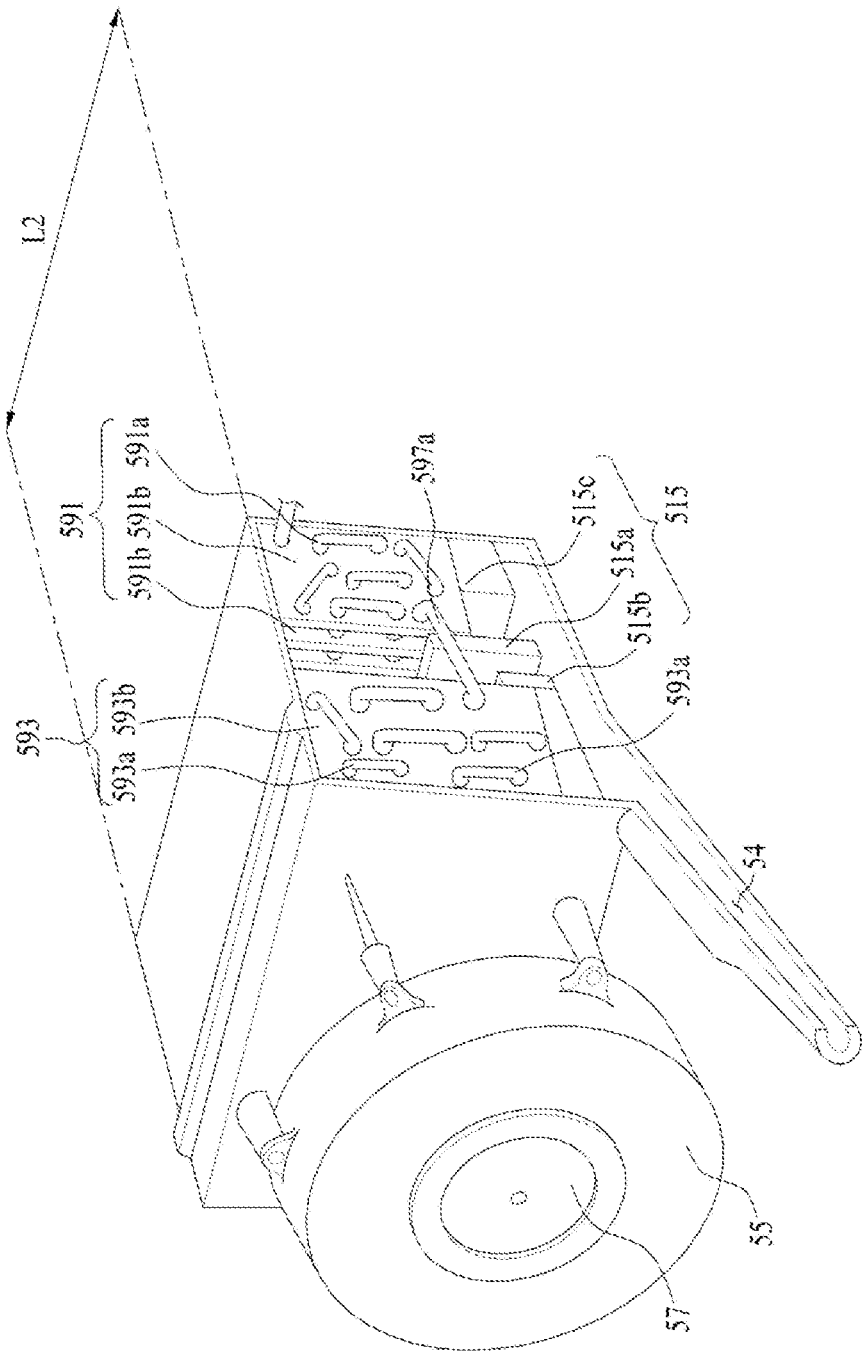

L2
591
591a
591b
591b
593
593b
593a
597a
515c
515
515a
515b
593a
54
55
57

FIG. 5A

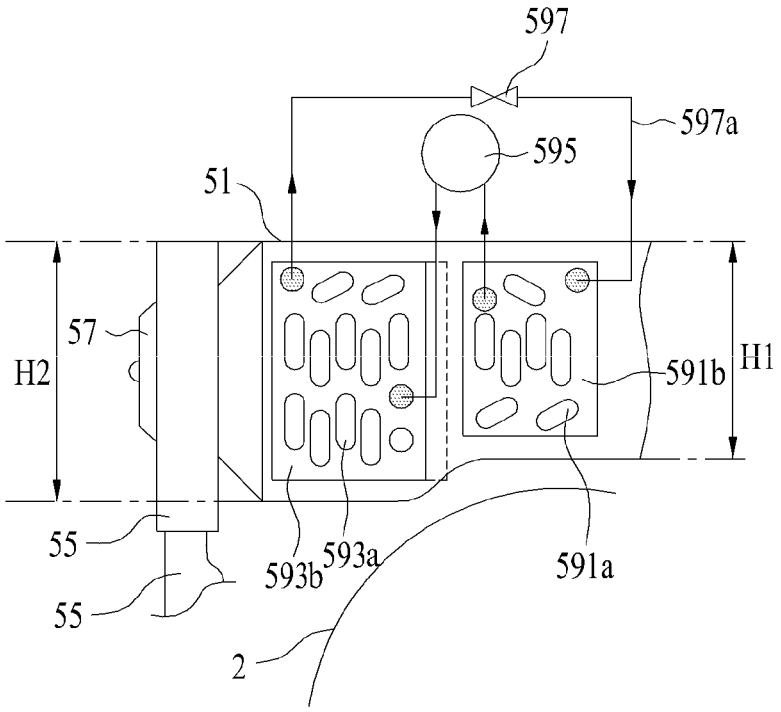


FIG. 5B

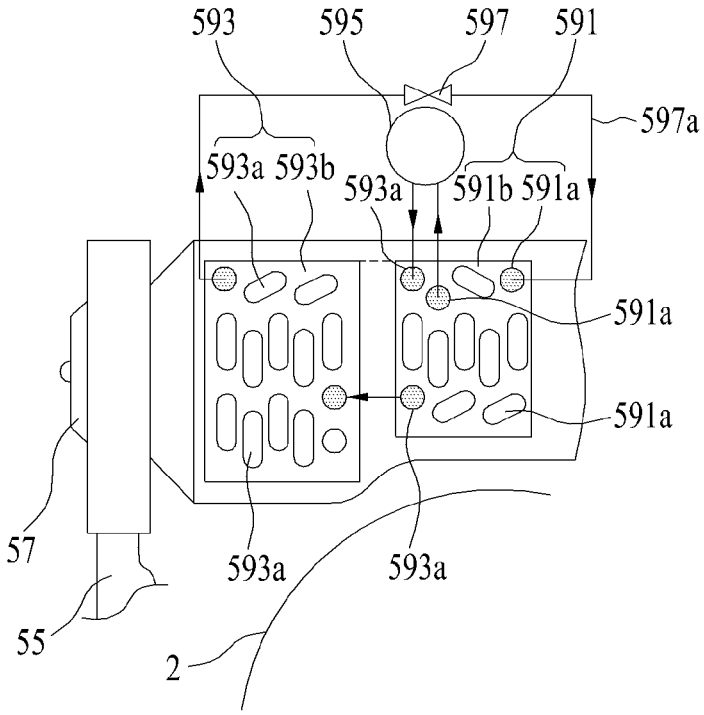

593
595
597
591
597a
593a
593b
593a
591b
591a
591a
591a
57
593a
593a
55
2

FIG. 6

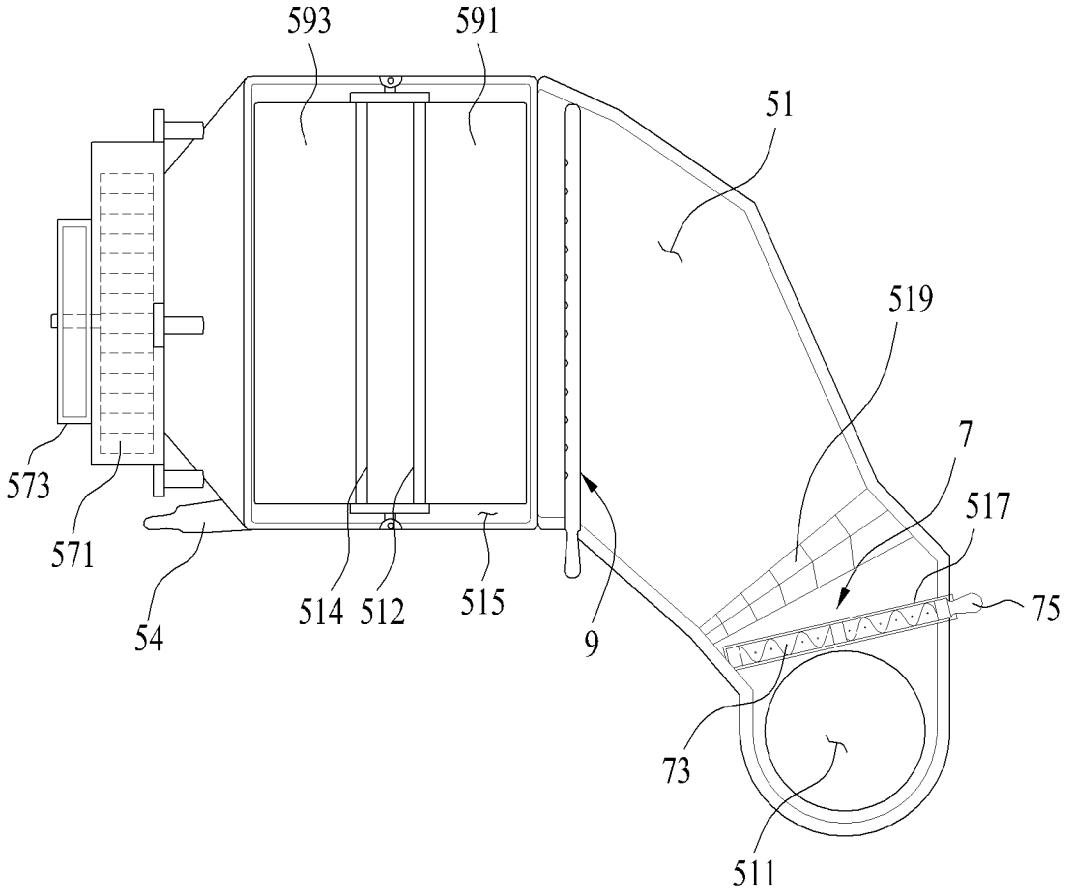


FIG. 7A

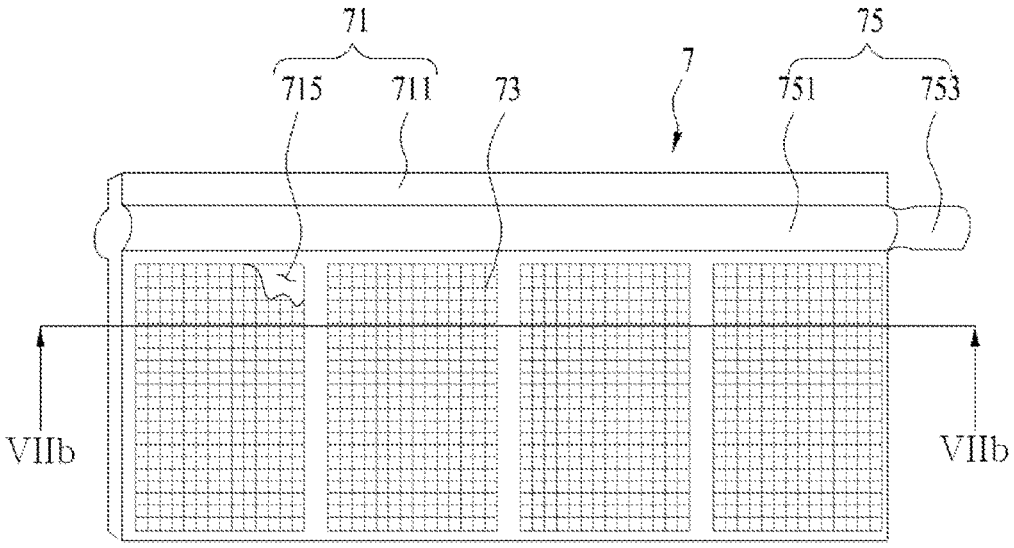

71
75
715
711
73
7
751
753
VIIb
VIIb

FIG. 7B

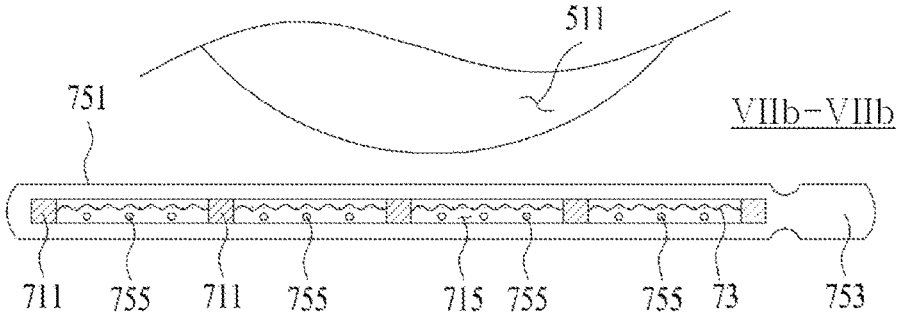

511
751
VIIb-VIIb
711
755
711
755
715
755
755
73
753

FIG. 8A

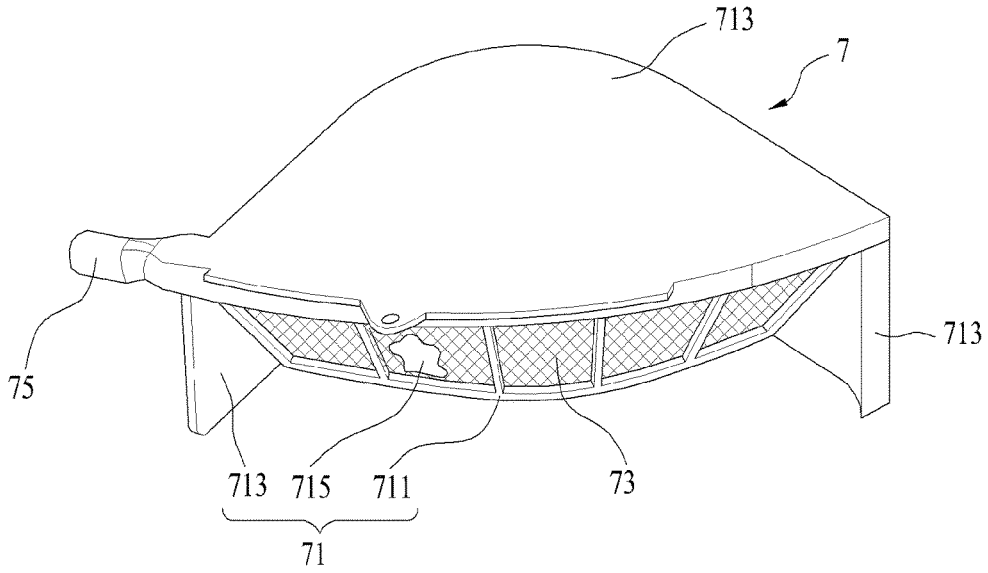
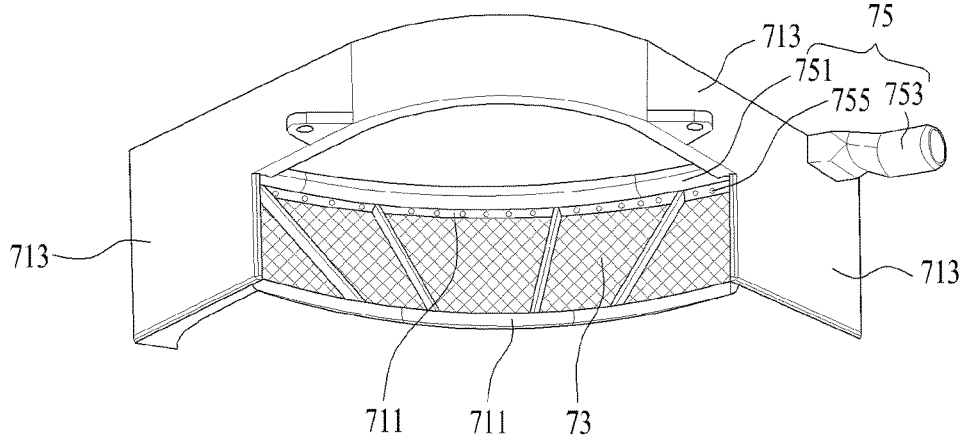

713
7
75
713
713
715
711
73
71

FIG. 8B


75
713
751
755
753
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713
711
711
73

FIG. 9A

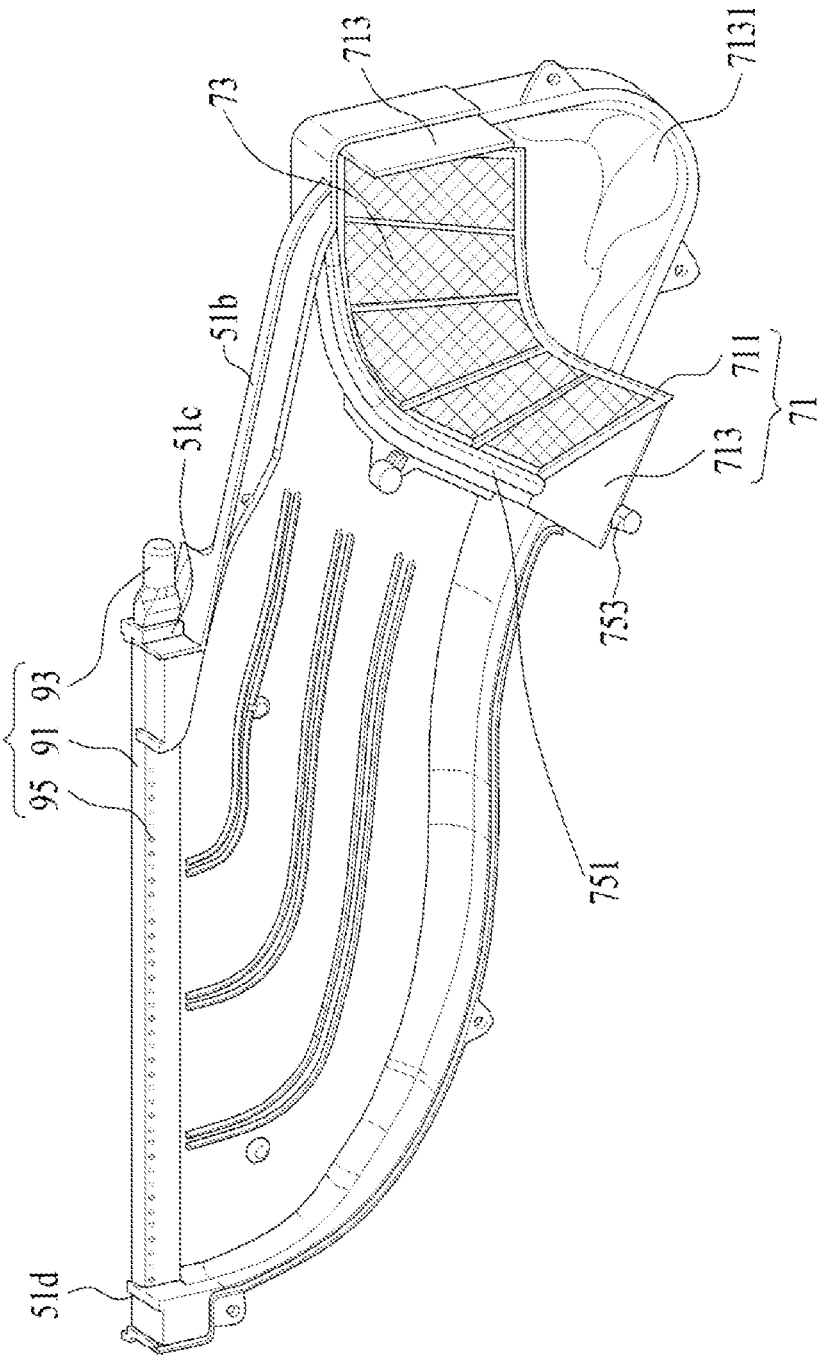
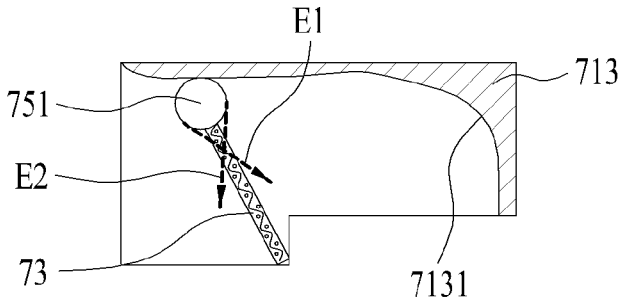


FIG. 9B



LAUNDRY TREATING APPARATUS

CROSS-REFERENCE TO RELATED APPLICATION(S)

Pursuant to 35 U.S.C. §119(a), this application claims the benefit of earlier filing date and right of priority to Korean Application No. 10-2014-0147788, filed in Korea on Oct. 28, 2014, the contents of which is incorporated by reference herein in its entirety.

BACKGROUND

1. Field

A laundry treating apparatus is disclosed herein.

2. Background

A laundry treating apparatus includes an apparatus for washing or drying laundry, and an apparatus for washing and drying laundry. A laundry treating apparatus capable of drying laundry is configured to supply air at a high temperature (hot blast) to laundry, which may be classified into an exhaust type and a circulation type (condensation type) according to an air flow method.

The circulation type laundry treating apparatus includes structure to circulate air inside of a laundry accommodation unit or device in which laundry is placed. With this structure, air discharged from the laundry accommodation device is heated after moisture is removed (dehumidifying) from the air, and then the air is re-supplied to the laundry accommodation device.

The exhaustion type laundry treating apparatus includes structure to supply heated air to a laundry accommodation device. With this structure, air discharged from the laundry accommodation device is discharged outside of the laundry treating apparatus, without being circulated.

A hot air supply unit or device, provided at the conventional laundry treating apparatus, includes a blower configured to discharge air inside of a laundry accommodation unit, and a heat exchange unit or heat exchanger configured to heat air which flows by the blower. The heat exchange unit, a means to exchange heat with air, may have lowered heat exchange efficiency, in a case in which foreign materials are laminated thereon.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments will be described in detail with reference to the following drawings in which like reference numerals refer to like elements, and wherein:

FIGS. **1** and **2** are cross-sectional and perspective views of a laundry treating apparatus according to an embodiment;

FIG. **3** is a view illustrating a circulation passage provided at a laundry treating apparatus according to an embodiment;

FIGS. **4**, **5**A and **5**B are views illustrating a heat exchanger provided at a laundry treating apparatus according to an embodiment;

FIGS. **6**, **7**A and **7**B are views illustrating a filter device provided at a laundry treating apparatus according to an embodiment; and

FIGS. **8**A, **8**B, **9**A and **9**B are views illustrating a filter device provided at a laundry treating apparatus according to another embodiment of the present invention.

DETAILED DESCRIPTION

FIG. **1** is a cross-sectional view of a laundry treating apparatus according to an embodiment. As shown in FIG. **1**, laundry treating apparatus **100** may include a cabinet **1**, which forms an outer appearance thereof, laundry accommodation units or devices **2** and **3** provided in the cabinet **1** to accommodate laundry therein, and a hot blast supply unit or device **5** that supplies a hot blast to the laundry accommodation devices **2** and **3**. The cabinet **1** may include an introduction opening **11**, into which laundry may be introduced, and a door **13** rotatably provided at the cabinet **1** to open and close the introduction opening **11**.

In a case in which the laundry treating apparatus **100** serves as an apparatus for only drying laundry, the laundry accommodation devices may be provided with only a drum **3** rotatably provided in the cabinet **1**. On the other hand, if the laundry treating apparatus **100** serves as an apparatus for washing and drying laundry, the laundry accommodation devices may be provided with a tub **2** provided in the cabinet **1** to accommodate washing water therein, and a drum **3** rotatably provided in the cabinet **1** to accommodate laundry therein.

The tub **2** may have a hollow cylindrical shape, and be fixed to an inside of the cabinet **1**. A tub introduction opening **21**, through which laundry may be introduced, may be provided on or at a front surface of the tub **2** and correspond to the introduction opening **11**.

A gasket **23** may be provided between the tub introduction opening **21** and the introduction opening **11**. The gasket **23** may prevent washing water stored in the tub **2** from leaking outside of the tub **2**, and prevent vibrations from the tub **2** from being transmitted to the cabinet **1** when the drum **3** is rotated. Thus, the gasket **23** may be a vibration isolation member, and may be formed of rubber.

The tub **2** may be installed such that a central longitudinal axis of the tub **2** extends parallel to a ground surface on which the cabinet **1** is supported, or may be installed with a predetermined inclination angle with respect to the ground surface. If the tub **2** is installed with an inclination of a predetermined angle with respect to the ground surface, the predetermined inclination angle may be less than about 90°.

An exhaust unit or device **27**, through which air inside the tub **2** may be discharged, may be provided at an upper portion of a circumferential surface of the tub **2**. A drain unit or device **25** that discharges the washing water stored in the tub **2** may be provided at a lower portion of the tub **2**.

The exhaust device **27** is provided in the tub **2**. The exhaust device **27** may be spaced a predetermined distant from a straight line (A) that passes through a center of the tub **2**, for example, a predetermined distance (L**1**) (refer to FIG. **2**). The reason is to easily discharge air inside of the tub **2** from the tub **2** through the exhaust device **27** when the drum **3** is rotated.

The drain device **25** may include a drain pump **255**, a first drain pipe **251** that connects the drain pump **255** with the tub **2**, and a second drain pipe **253** that guides washing water introduced into the drain pump **255** outside of the cabinet **1**.

The tub **2** may be supplied with washing water through a water supply pipe **151** that connects the tub **2** with a water supply source. If a detergent supply unit or device **15** that supplies detergent to the tub **2** is provided at the cabinet **1**, the water supply pipe **151** may be provided to supply washing water to the detergent supply device **15**. In this case, the washing water supplied to the detergent supply device **15** may be supplied to the tub **2** through a detergent supply pipe **153**.

The drum **3** may have a hollow cylindrical shape, and may be provided in the tub **2**. The drum **3** may be rotatable by a drive provided outside of the tub **2**. In this case, the drive may include a stator **335** fixed to a rear surface of the tub **2**,

a rotor **331** rotated by an electromagnetic operation with the stator **335**, and a rotational shaft **333** that connects a rear surface of the drum **3** with the rotor **331** by passing through the rear surface of the tub **2**.

A drum introduction opening **31**, which may communicate with the introduction opening **11** and the tub introduction opening **21**, may be provided on a front side of the drum **3**. With such a configuration, a user may put laundry into the drum **3** through the introduction opening **11**, or may withdraw laundry stored in the drum **3** outside of the cabinet **1**.

As shown in FIG. **2**, the hot blast supply device **5** may include circulation passages **51**, **53**, and **55** that guide air discharged from the inside of the tub **2** to a front side of the tub **2**, a blower **57** provided at or in the circulation passages **51**, **53**, and **55** that circulates air inside of the tub **2**, and a heat exchange unit or heat exchanger **59** provided in the circulation passages **51**, **53**, and **55**. The circulation passages **51**, **53**, and **55** may include a first connection duct **53** connected to a rear side of the tub **2**, a duct **51** connected to the first connection duct **53** and having the heat exchanger **59** provided therein or thereon, and a second connection duct **55** that guides air discharged from the duct **51** to a front side of the tub **2**.

The first connection duct **53** may be a passage connected to the exhaust device **27** provided on or at a rear side of the circumferential surface of the tub **2**, and may be a vibration isolation member, and may be formed of rubber. This may prevent vibrations transmitted to the tub **2** from being transmitted to the heat exchanger **59** provided in the duct **51** through the first connection duct **53** when the drum **3** is rotated.

The first connection duct **53** may include a bellows, in order to effectively prevent transmission of vibrations generated from the tub **2**, to the duct **51** and the heat exchanger **59**. The second connection duct **55** may be connected to any point on the tub **2**, if air discharged from the duct **51** is guided to a front side of the tub **2**. FIG. **2** illustrates a case in which the second connection duct **55** supplies air into the tub **2** through the gasket **23**. In this case, a supply unit or device **29** that communicates with the second connection duct **55** may be further provided at the gasket **23**.

The blower **57** may be provided at the second connection duct **55**. The blower **57** may include an impeller (not shown) provided in the second connection duct, and an impeller motor (not shown) that rotates the impeller **571**.

As shown in FIG. **3**, an inlet **511** that communicates with the first connection duct **53**, and a communication unit or device **513** that communicates with the second connection duct **55** may be provided at the duct **51**. Thus, the duct **51** may serve as a means to guide air supplied into the inlet **511**, to the second connection duct **55**.

The duct **51** may include a base **51***a* to support the heat exchanger **59**, and a cover **51***b* fixed to the base **51***a*. In this case, the inlet **511** and the communication device **513** may be provided at the base **51***a*.

The heat exchanger **59** may be a heat pump. A first heat exchanger **591** (evaporator) and a second heat exchanger **593** (condenser) provided at the heat exchanger **59** may be fixed to an inside of the duct **51**, and a compressor **595** may be provided to supply a refrigerant discharged from the evaporator **591** to the condenser **593** after compressing the refrigerant. The refrigerant supplied to the condenser **593** may be re-supplied to the evaporator **591** via an expansion device **597**.

As shown in FIG. **4**, the evaporator **591** may include first heat exchange plates **591***b*, and first refrigerant pipes **591***a* fixed to the first heat exchange plates **591***b*. For example, the first heat exchange plates **591***b* may include a plurality of metallic plates fixed in parallel in a lengthwise direction of the circulation passages (a moving direction of air). In this case, the first heat exchange plates **591***b* may be spaced from each other by a predetermined distance, in a widthwise direction (L**2**) of the circulation passages. The first refrigerant pipes **591***a*, which provide a moving path of a refrigerant, may be fixed to the first heat exchange plates **591***b*.

The evaporator **591** may evaporate a refrigerant after the refrigerant absorbs heat from air introduced into the duct **51**. Thus, the evaporator **591** may serve as a means to remove moisture contained in air by cooling the air.

The duct **51** may further include a condensate water discharge unit or device **54** that discharges moisture removed from air (condensate water) by the evaporator **591** outside of the circulation passages. The condensate water discharge device **54** may be connected to the drain device **25** by a discharge pipe **541**.

The condenser **593** may condense a refrigerant. Heat generated while a refrigerant is condensed may be transmitted to air passing through the condenser **593**. Thus, the condenser **593** may serve as a means to heat air which has passed through the evaporator **591**. The condenser **593** may include second heat exchange plates **593***b*, and second refrigerant pipes **593***a* fixed to the second heat exchange plates **593***b*.

The evaporator **591** and the condenser **593** may be fixed to a first mounting unit or device **515** provided in the duct **51**. The first mounting device **515** may include a first supporting portion **515***c* that supports a lower surface of the evaporator **591**, a second supporting portion **515***b* that supports a lower surface of the condenser **593**, and a partition wall **515***a* provided between the evaporator **591** and the condenser **593**. Such a configuration may prevent moisture removed from air passing through the evaporator **591** (condensate water) from moving to the condenser **593**, and allow the condensate water to easily flow to the condensate water discharge device **54**.

As shown in FIG. **5**A, as the circulation passages **51**, **53**, and **55** may be positioned above the circumferential surface of the tub **2**, and a space in which the evaporator **591** is positioned and a space in which the condenser **593** is positioned may have different volumes. If a duct height (H**1**) of a region in which the evaporator **591** is fixed is different from a duct height (H**2**) of a region in which the condenser **593** is fixed, a heat exchange amount of the evaporator **591** may be different from a heat exchange amount of the condenser **593**. In this case, it may be difficult to solve such a difference between the heat exchange amount of the evaporator **591** and the heat exchange amount of the condenser **593**, by merely increasing a volume of the evaporator **591** or the condenser **593**, because the volume of the evaporator **591** or the condenser **593** is restricted by a shape of the duct **51**.

More specifically, referring to FIG. **5**A, it is difficult to increase a length of the second heat exchange plate **593***b* without changing a shape of the duct **51**. The reason is because the second heat exchange plate **593***b* may interfere with the duct **51** even when a length of the second heat exchange plate **593***b* is increased toward the evaporator **591**, for an increased volume of the condenser **593**.

In order to solve such a problem, the condenser **593** may be formed such that a portion of its refrigerant pipes is fixed to the first heat exchange plates **591***b* of the evaporator **591**. As shown in FIG. **5**B, the evaporator **591** may include the first heat exchange plates **591***b* and the first refrigerant pipes **591***a* fixed to the first heat exchange plates **591***b*. The

condenser **593** may include the second heat exchange plates **593***b* that exchange heat with air having passed through the first heat exchange plates **591***b*, and the second refrigerant pipes **593***a* fixed to the second heat exchange plates **593***b*. In this case, a portion of the second refrigerant pipes **593***a* may be fixed to the first heat exchange plates **591***b* of the evaporator **591**.

More specifically, a refrigerant, which has passed through the first heat exchange plates **591***b* via the first refrigerant pipes **591***a*, may be introduced into the second refrigerant pipe **593***a* via the compressor **595**. The second refrigerant pipe **593***a* may pass through the first heat exchange plates **591***b* and the second heat exchange plates **593***b*, sequentially. With such a structure, a length of the second refrigerant pipes **593***a* may be increased, and thus, a heat exchange amount of the evaporator **591** may become equal to a heat exchange amount of the condenser **593**. Further, the refrigerant, discharged from the second heat exchange plates **593***b* through the second refrigerant pipes **593***a*, may be re-supplied to the first refrigerant pipes **591***a* via a connection pipe **597***a* and the expansion device **597**.

As shown in FIG. **6**, the laundry treating apparatus **100** may further include a filter unit or device **7** that prevents lamination of foreign materials on the heat exchanger **59**, by filtering air introduced into the circulation passages **51**, **53**, and **55** after being discharged from the tub **2**. As shown in FIGS. **7**A and **7**B, the filter device **7** may include a filter frame **71** provided between the heat exchanger **59** and the inlet **511**, a filter **73** fixed to the filter frame **71** to filter foreign materials and positioned on a sectional surface of the circulation passages, and a filter washer **75** fixed to the filter frame **71** to spray washing water to the filter **73**.

The filter frame **71** may include a body **711** provided on a sectional surface of the duct **51**, which may be perpendicular to an air flow direction, and an open surface **715** provided to pass through the body **711**. In this case, the filter **73** may be fixed to the body **711**, thereby being positioned at the open surface **715**.

The filter washer **75** may include a passage body **751** fixed to the body **711** to introduce washing water thereinto, and one or more discharge hole **755** to discharge the washing water inside of the passage body **751** into the filter **73**. The passage body **751** may be fixed to an upper portion of the open surface **715**. The passage body **751** may be supplied with washing water from a water source, through a connection body **753** exposed to an outside of the duct **51** by passing through the duct **51**.

The discharge hole(s) **755** may spray washing water, such that foreign materials remaining on the filter **73** may be moved toward the inlet **511**, to introduce foreign materials separated from the filter **73** into the tub **2** via the inlet **511**, the first connection duct **53** and the exhaust device **27**, and then to discharge the foreign materials outside of the cabinet **1** when the drain device **25** is operated.

The filter device **7** may be detachably mounted to the circulation passages **51**, **53**, and **55**. That is, the filter frame **71** may be provided so as to be withdrawn from the duct **51**. For this, the duct **51** may further include an insertion hole (not shown) into which the filter frame **71** may be inserted.

As shown in FIG. **6**, the duct **51** may further include a second mounting unit or device **517** to support the filter frame **71**. In this case, the second mounting device **517** may be provided at a higher position than the first mounting device **515**, in order to prevent condensate water generated by the heat exchanger **59** from being introduced into the inlet **511**. The duct **51** may further include an inclined unit or device **519** downward-inclined from the second mounting device **517** towardly the first mounting device **515**, to rapidly discharge washing water discharged from the discharge hole(s) **755**, outside of the duct **51** through the condensate water discharge device **54**, in a case in which a portion of the washing water discharged from the discharge hole(s) **755** is to be supplied to the heat exchanger **59**.

The filter **73** may have a flat surface inclined from a sectional surface of the duct **51** by a predetermined angle, or may be formed to have a curved surface that protrudes in a direction that extends away from the inlet **511**. Alternatively, the filter **73** may be formed to have a curved surface inclined from a sectional surface of the duct **51** by a predetermined angle. Such structures are implemented for maximization of a filtering capacity of the filter **73**.

In a case in which the filter **73** has a flat surface inclined from a sectional surface of the duct **51** by a predetermined angle, a distance from a lower end of the filter **73** to the inlet **511** may be shorter or longer than a distance from an upper end of the filter **73** to the inlet **511**. Considering that foreign materials may be moved to the inlet **511** by washing water sprayed from the discharge hole(s) **755**, the distance from the lower end of the filter **73** to the inlet **511** may be shorter than the distance from the upper end of the filter **73** to the inlet **511**.

FIGS. **8**A and **8**B illustrate an example of the filter device **7** including the filter **73** having a curved surface inclined from a sectional surface of the duct **51** by a predetermined angle. In this embodiment, the filter device **7** may also include the filter frame **71** provided between the heat exchanger **59** and the inlet **511**, the filter **73** fixed to the filter frame **71** to filter air and positioned on a sectional surface of the circulation passages (a sectional surface perpendicular to an air moving direction), and the filter washer **75** fixed to the filter frame **71** to spray washing water to the filter **73**.

The filter frame **71** may include body **711** formed to be convex in a direction that extends away from the inlet **511**, open surface **715** formed to pass through the body **711**, and guider **713** that guides air introduced into the inlet **511** toward the open surface **715**. As the filter **73** may be fixed to the open surface **715**, the guider **713** may serve as a means to guide air introduced into the inlet **511** to the filter **73**.

As shown in FIG. **9**A, the guider **713** may be further provided with an inclined surface **7131** in order to minimize lowering of a flow speed of air which moves from the inlet **511** to the filter **73**. In this embodiment, the filter **73** may be formed to be convex toward the heat exchanger **59**. Accordingly, the passage body **751** of the filter washer **75**, positioned on an upper end of the filter **73**, may also be formed to have a curved surface convex toward the heat exchanger **59**.

Referring to FIG. **9**B, the discharge hole(s) **755** provided at the filter washer **75** may spray washing water toward the filter **73**, from a rear side of the filter **73** (a direction toward the heat exchanger **59**) (E**1**), or may spray washing water toward the filter **73**, from a front upper side of the filter **73** (a direction toward the inlet) (E**2**).

As discussed above, the inclined device **519** (refer to FIG. **3**) may be provided between the second mounting device **517** to support a lower end of the filter **73**, and the first mounting device **515** to support the heat exchanger **59**. Accordingly, in the latter case (E**2**), washing water may be discharged outside of the duct **51**, through the condensate water discharge device **54**. In the former case (E**1**), washing water sprayed from the discharge hole(s) **755** may be discharged outside of the circulation passages through the inlet **511**.

In the laundry treating apparatus **100** having the aforementioned structure, foreign materials may be laminated on or attached to the heat exchanger **59**. This may lower heat exchange efficiency. In order to solve such a problem, the laundry treating apparatus according to embodiments may further include washer **9** to spray washing water onto the heat exchanger **59**.

As shown in FIG. **6** or **9**A, the washer **9** may include a second passage body **91** provided in a widthwise direction of the circulation passages **51**, **53**, and **55** to introduce washing water thereinto, and one or more second discharge hole **95** to discharge the washing water inside of the second passage body **91** to the heat exchanger **59**. The second passage body **91** may be detachably mounted to the circulation passages **51**, **53**, and **55**. For this, the duct **51** may further include a first coupling unit or device **51***c* and a second coupling unit or device **51***d* each to support the second passage body **91**. The first coupling device **51***c* may be a hole that passes through the cover **51***b* of the duct **51**. The second coupling device **51***d* may be a groove provided at the cover **51***b*. The groove may support one end of the second passage body **91**, which has been inserted into the first coupling device **51***c*. The second passage body **91** may be connected to a water source through a second connection body **93** formed to pass through the duct **51**.

Embodiments disclosed herein provide a laundry treating apparatus capable of simultaneously cleaning a filter device that filters air supplied to a heat exchanger, and the heat exchanger.

Embodiments disclosed herein provide a laundry treating apparatus that may include a laundry accommodation unit or device configured to provide a space in which laundry may be accommodated, having an exhaust unit or device configured to exhaust air, and having a supply unit or device configured to supply air; a circulation passage configured to guide air exhausted from the exhaust unit to the supply unit, and having an inlet that communicates with the exhaust unit; a heat exchange unit or heat exchanger disposed or provided in the circulation passage; a filter frame disposed or provided between the heat exchange unit and the inlet; a filter fixed to the filter frame, and disposed or provided on a sectional surface of the circulation passage; and a filter washing unit or washer fixed to the filter frame, and configured to supply washing water to the filter. The filter frame may include a body provided at the circulation passage, and an open surface provided to pass through the body. The filter may be fixed to the open surface, and the filter washing unit may be fixed to the body.

The filter washing unit may include a passage body configured to introduce washing water thereinto, and disposed or provided above the open surface, and a discharge hole configured to discharge the washing water inside of the passage body into the filter. The discharge hole may be configured to spray washing water, such that foreign materials remaining on the filter may be moved toward the inlet.

The filter frame may be provided so as to be withdrawn from the circulation passage. A distance from a lower end of the filter to the inlet may be shorter than a distance from an upper end of the filter to the inlet. The distance from the lower end of the filter to the inlet may be longer than the distance from the upper end of the filter to the inlet. The filter may be formed to have a convex surface toward a direction which becomes far from the inlet.

The inlet may be provided on a plane that contacts a lower end of the filter. The filter frame may further include a guider configured to guide air introduced from the inlet toward the filter.

The laundry treating apparatus may further include a washing unit or washer configured to spray washing water to the heat exchange unit. The washing unit may include a second passage body disposed or provided in a widthwise direction of the circulation passage, and configured to introduce washing water thereinto, and a second discharge hole configured to discharge the washing water inside of the second passage body to the heat exchange unit.

The heat exchange unit may include a first heat exchange plate configured to exchange heat with air inside of the circulation passage; a first refrigerant pipe fixed to the first heat exchange plate; a second heat exchange plate disposed or provided in the circulation passage, and configured to exchange heat with air which has passed through the first heat exchange plate; a second refrigerant pipe fixed to the first and second heat exchange plates; a compression part or compressor configured to supply a refrigerant discharged from the first refrigerant pipe to the second refrigerant pipe, in a compressed manner; and an expansion part or device configured to move the refrigerant discharged from the second refrigerant pipe, to the first refrigerant pipe, after lowering a pressure of the refrigerant. The circulation passage may include a first mounting unit or device configured to support the heat exchange unit, and a second mounting unit or device configured to support a lower end of the filter frame, and disposed or provided at a higher position than the first mounting unit.

The circulation passage may further include a drain unit or device configured to discharge the water inside of the laundry accommodation unit, and a discharge pipe configured to connect the first mounting unit with the drain unit.

Embodiments disclosed herein provide a laundry treating apparatus having a filter device to filter air supplied to a heat exchange unit, and capable of cleaning the filter device.

Any reference in this specification to "one embodiment," "an embodiment," "example embodiment," etc., means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment. The appearances of such phrases in various places in the specification are not necessarily all referring to the same embodiment. Further, when a particular feature, structure, or characteristic is described in connection with any embodiment, it is submitted that it is within the purview of one skilled in the art to effect such feature, structure, or characteristic in connection with other ones of the embodiments.

Although embodiments have been described with reference to a number of illustrative embodiments thereof, it should be understood that numerous other modifications and embodiments can be devised by those skilled in the art that will fall within the spirit and scope of the principles of this disclosure. More particularly, various variations and modifications are possible in the component parts and/or arrangements of the subject combination arrangement within the scope of the disclosure, the drawings and the appended claims. In addition to variations and modifications in the component parts and/or arrangements, alternative uses will also be apparent to those skilled in the art.

What is claimed is:

1. A laundry treating apparatus, comprising:

laundry accommodation device that provides a space in which laundry is accommodated, the laundry accommodation device having an exhaust device that exhausts air and a supply device that supplies air;

a circulation passage that glides air exhausted from the exhaust device to the supply device, the circulation passage having an inlet that accommodates the exhaust device;

a heat exchanger provided in the circulation passage;

a filter frame provided between the heat exchanger and the inlet;

a filter fixed to the filter frame and provided in the circulation passage; and

a filter washer fixed to the filter frame, that supplies washing water to the filter, wherein the filter frame includes:

a body provided in the circulation passage; and

an opening provided to pass through the body, wherein the filter is fixed to the opening, and wherein the filter washer is provided at and fixed to the body, and includes:

a passage body provided above the opening and into which washing water is received;

one or more discharge hole that discharges the washing water inside of the passage body to the filter; and

a connection body exposed to an outside of the circulation passage by passing through the circulation passage and connected to a water source so as to supply the washing water to the passage body.

2. The laundry treating apparatus of claim **1**, wherein the one or more discharge hole sprays washing water such that foreign materials remaining on the filter are moved toward the inlet.

3. The laundry treating apparatus of claim **1**, wherein the filter frame is removably provided in the circulation passage.

4. The laundry treating apparatus of claim **1**, wherein a distance from a lower end of the filter to the inlet is shorter than a distance from an upper end of the filter to the inlet.

5. The laundry treating apparatus of claim **1**, wherein a distance from a lower end of the filter to the inlet is longer than a distance from an upper end of the filter to the inlet.

6. The laundry treating apparatus of claim **1**, wherein the filter is formed to have a convex surface in a direction that extends away from the inlet.

7. The laundry treating apparatus of claim **6**, wherein the inlet is provided on a plane in contact with a lower end of the filter, and wherein the filter frame further includes a guider that guides air introduced from the inlet toward the filter.

8. The laundry treating apparatus of claim **1**, further including a heat exchanger washer configured to spray washing water onto the heat exchanger.

9. The laundry treating apparatus of claim **8**, wherein the heat exchanger washer includes:

a passage body provided in a widthwise direction of the circulation passage, that receives washing water thereinto; and

one or more discharge hole that discharges the washing water inside of the passage body to the heat exchanger.

10. The laundry treating apparatus of claim **1**, wherein the heat exchanger includes:

at least one first heat exchange plate that exchanges heat with air inside of the circulation passage;

at least one first refrigerant pipe fixed to the at least one first heat exchange plate;

at least one second heat exchange plate provided in the circulation passage, that exchanges heat with air which has passed through the at least one first heat exchange plate;

at least one second refrigerant pipe fixed to the at least one first heat exchange plate and to the at least one second heat exchange plate;

a compressor that supplies a refrigerant discharged from the at least one first refrigerant pipe to the at least one second refrigerant pipe, in a compressed manner; and

an expansion device that moves the refrigerant discharged from the at least one second refrigerant pipe, to the at least one first refrigerant pipe, after lowering a pressure of the refrigerant.

11. The laundry treating apparatus of claim **10**, wherein the circulation passage includes:

a first mounting device that supports the heat exchanger; and

a second mounting device that supports a lower end of the filter frame, wherein the second mounting device is provided at a higher position than a position of the first mounting device.

12. The laundry treating apparatus of claim **11**, wherein the circulation passage further includes:

a drain device that discharges the water inside of the laundry accommodation device; and

a discharge pipe that connects the first mounting device with the drain device.

13. A laundry treating apparatus, comprising:

a laundry accommodation device that provides a space in which laundry is accommodated, the laundry accommodation device having an exhaust device that exhausts air and a supply device that supplies air;

a circulation passage that guides air exhausted from the exhaust device to the supply device, the circulation passage having an inlet that accommodates the exhaust device;

a heat exchanger provided in the circulation passage;

a filter frame removably provided adjacent to the inlet;

a filter fixed to the filter frame and provided in the circulation passage; and

a filter washer fixed to the filter frame, that supplies washing water to the filter, wherein the filter frame includes:

a body provided in the circulation passage; and

an opening provided to pass through the body, wherein the filter is fixed to the opening, and wherein the filter washer is provided at and fixed to the body and includes:

a passage body provided above the opening and into which washing water is received;

one or more discharge hole that discharges the washing water inside of the passage body to the filter; and

a connection body exposed to an outside of the circulation passage by passing through the circulation passage and connected to a water source so as to supply the washing water to the passage body.

14. The laundry treating apparatus of claim **13**, wherein the filter is formed to have a convex surface in a direction that extends away from the inlet, wherein the inlet is provided on a plane in contact with a lower end of the filter, and wherein the filter frame further includes a guider that guides air introduced from the inlet toward the filter.

15. A laundry treating apparatus, comprising:

a laundry accommodation device that provides a space in which laundry is accommodated, the laundry accommodation device having an exhaust device that exhausts air and a supply device that supplies air;

a circulation passage that guides air exhausted from the exhaust device to the supply device, the circulation passage having an inlet that accommodates the exhaust device;

a heat exchanger provided in the circulation passage;

a filter frame provided adjacent to the inlet;

a filter fixed to the filter frame and provided in the circulation passage, wherein the filter is formed to have a convex surface in a direction that extends away from the inlet; and

a filter washer fixed to the filter frame, that supplies washing water to the filter, wherein the filter frame includes:

a body provided in the circulation passage; and

an opening provided to pass through the body, wherein the filter is fixed to the opening, and wherein the filter washer is provided at and fixed to the body and includes:

a passage body provided above the opening and into which washing water in received;

one or more discharge hole that discharges the washing water inside of the passage body to the filter; and

a connection body exposed to an outside of the circulation passage by passing through the circulation passage and connected to a water source so as to supply the washing water to the passage body.

16. The laundry treating apparatus of claim **15**, wherein the inlet is provided on a plane in contact with a lower end of the filter, and wherein the filter frame further includes a guider that guides air introduced from the inlet toward the filter.

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