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HEAT-EXCHANGE COIL ASSEMBLY

BACKGROUND OF THE INVENTION

5 The present invention relates to a heat-exchange coil assembly, and more particularly to a heat-exchange coil assembly for making heat exchange performed between a heat-exchange medium accommodated in a drum of a heat exchanger and a heat-exchange medium flowing in the coil.

10 The inventor for the present invention has already proposed, as disclosed in Japanese Patent Laid-Open Publication No.8 - 54192, a heat-exchange coil assembly in which a plurality of heat-exchange coils each having a different winding diameter are arranged so that they have a common center line. With this heat-exchange coil assembly, there
15 are provided the advantages that the heat exchange efficiency can be improved without making larger a drum capacity of the heat exchanger, and that the heat exchange capability can freely be set.

In this type of heat-exchange coil assembly, both edges
20 of each of the heat-exchange coils 28-1, 2, 3, 4, and 5 are linked to an inlet header 22 and an outlet header 24 respectively. As the linkage is achieved by welding the heat-exchange coils 28-1, 2, 3, 4, and 5 to the same side of the inlet header 22 and outlet header 24 against the center line
25 B-B thereof as shown in Fig. 27. Because of this configuration, a pitch P' between any adjoining two ones of the heat-exchange coils 28-1, 2, 3, 4, and 5 must be set to at least a value obtained by adding a width 2a of a welding space 29 to an external diameter P of the heat-exchange coils 28-1,
30 2, 3, 4, and 5, and this required configuration disadvantageously makes it difficult to realize a small-sized and compact heat-exchange coil assembly.

OBJECT AND SUMMARY OF THE INVENTION

35 The present invention was made to solve the problems associated with the conventional type of heat-exchange coil assembly based on the conventional technology as described

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above, and it is an object of the present invention to provide a heat-exchange coil assembly which prevents a pitch between adjoining heat-exchange coil pipes from becoming larger due to a welding space for linking an inlet header and an outlet header to the heat-exchange coil and can be installed within a space having a limited space because of this construction, and also which has a large heat conducting area.

To achieve the object as described above, the present invention provides a heat-exchange assembly coil comprising a medium inletting member having a heat-exchange medium inlet tube and an inlet header, a medium outletting member having a heat-exchange medium outletting tube and an outletting header, and a plurality of heat-exchange coils each having communicating the inlet header to the outlet header and having a different diameter, and the heat-exchange coil can be installed within a drum section of a heat exchanger and is characterized in that each of the heat-exchange coils is linked to the inlet headers and outlet headers alternately located to the opposite sides against a center line of each header.

The present invention is characterized in that the inlet headers and outlet headers are located in both sides of a common center line of the heat-exchange coils.

The present invention is characterized in that the inlet headers and outlet headers are located in one side of the common center line of the heat-exchange coils.

The present invention is characterized in that a plurality of inlet headers and a plurality of outlet headers are linked to one inlet tube and one outlet tube respectively and the inlet headers and outlet headers are linked to each other with a heat-exchange coil respectively.

The present invention is characterized in that the inlet tube and outlet tube comprises first and second inlet tubes and first and second outlet tubes respectively, tips of the inlet headers of the first and second inlet headers are not-communicably jointed to each other, tips of the



outlet headers of the first and second outlet tubes are not-communicably jointed to each other, and also that heat-exchange coil groups are arranged between the inlet header of the first inlet header and the outlet header of the first outlet header and between the inlet header of the second inlet tube and the outlet header of the second outlet tube respectively.

The present invention is characterized in that a group of heat-exchange coils corresponding to the first inlet tube and first outlet tube and a group of heat-exchange coils corresponding to the second inlet tube and second outlet tube are different from each other in terms of the coil length and coil diameter.

The present invention is characterized in that the heat-exchange coils are linked to the first and second inlet headers alternately, and are also linked to the first and second outlet headers alternately.

The present invention is characterized in that tips of the first and second inlet headers of the first inlet tube are not-communicably jointed to the first and second inlet headers of the second inlet tube, tips of the first and second outlet headers of the first outlet tube are not-communicably linked to tips of the first and second outlet headers of the second outlet tube, and also that heat-exchange coil groups are arranged between the first and second inlet headers of the first inlet tube and first and second outlet headers of the first outlet tube and between the first and second inlet headers of the second inlet tube and the first and second outlet headers of the second outlet tube respectively.

The present invention is characterized in that a group of heat-exchange coils corresponding to the first inlet tube and first outlet tube and a group of heat-exchange coils corresponding to the second inlet tube and second outlet tube are different from each other in terms of the coil length and coil diameter.

The present invention is characterized in that, in a

heat-exchange coil assembly installed in a drum section of the heat exchanger and comprising a medium inletting member having an inlet tube and an inlet header each for inletting a heat-exchange medium, a medium outletting member having an outlet tube and an outlet header each for outletting a heat-exchange medium, and a plurality of heat-exchange coils each communicating the inlet header to the outlet header and having a different winding diameter, the medium inletting member and medium outletting member are adjoining and located at positions close to each other.

The present invention is characterized in that the inlet header and outlet header are located in a single tube and formed with chambers separated from each other with a partition.

The present invention is characterized in that the heat-exchange coils have the same length.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a front view showing a first embodiment of the present invention;

Fig. 2 is a flat view showing the same;

Figs. 3 is a partially lacked view showing the same cut along the line 3-3 in Fig. 1 and viewed from a direction indicated by the arrow;

Fig. 4 is a general diagram showing a second embodiment of the present invention;

Fig. 5 is a general diagram showing a third embodiment of the present invention;

Fig. 6 is a general diagram showing a fourth diagram of the present invention;

Fig. 7 is a cross-sectional view showing a fifth embodiment of the present invention;

Fig. 8 is a flat view showing the same;

Fig. 9 is a front view showing a sixth embodiment of the present invention;

Fig. 10 is a flat view showing the same;

Fig. 11 is a front view showing a seventh embodiment of



the present invention;

Fig. 12 is a cross-sectional view showing an eighth embodiment of the present invention;

Fig. 13 is a flat view showing the same;

5 Fig. 14 is a front view showing a linking section of a header of the same;

Fig. 15 is a partially lacked cross-sectional view showing a ninth embodiment of the present invention;

Fig. 16 is a flat view showing the same;

10 Fig. 17 is a front view showing a tenth embodiment of the present invention;

Fig. 18 is a flat diagram showing the same;

Fig. 19 is a front view showing an eleventh embodiment of the present invention;

15 Fig. 20 is a flat view showing the same;

Fig. 21 is a cross-sectional view showing a twelfth embodiment of the present invention cut along the line 21-21 in Fig. 22 and viewed from a direction indicated by the arrow;

20 Fig. 22 is a flat view showing the same;

Fig. 23 is a cross-sectional view showing a thirteenth embodiment of the present invention cut along the line 23 to 23 in Fig. 24 and viewed from a direction indicated by the arrow;

25 Fig. 24 is a flat view showing the same;

Fig. 25 is a vertical cross-sectional view showing a heat exchanger in which the heat-exchange coil assembly according to the present invention is applied;

30 Fig. 26 is a lateral cross-sectional view showing the same; and

Fig. 27 is a partially lacked flat view showing a linking section between a heat-exchange coil and an inlet tube and an outlet tube in a heat-exchange coil assembly similar to that according to the present invention but based on the conventional technology.

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DETAILED DESCRIPTION OF THE EMBODIMENTS

Description is made hereinafter for embodiments of the present invention with reference to the related drawings.

5 In a first embodiment of the present invention shown in Figs. 1 to 3, the reference numeral 1 indicates a heat-exchange coil assmebly 1, and in this heat-exchange coil assmebly 1, an inlet 2 is provided at a lower edge of an inlet tube 3 in a posture substantially perpendicular there-
10 to and an outlet header 4 is provided at a lower edge of an outlet tube 5 in a posture substantially perpendicular thereto.

The inlet tube 3 and outlet tube 5 are located in parallel to each other, and the inlet header 2 and outlet
15 header 4 are located with a space therebetween in the center line C-C of the inlet tube 3 as well as of the outlet tube 5. A plurality of outflow ports 6-1, 3, 5 and 6-2, 4 (five holes in this embodiment) are provided on the peripheral wall of the inlet header 2 in both sides of the center line thereof with a specified pitch. The outflow ports 6-1, 3, 5
20 each having an odd number are located in one side of the center line B-B of the inlet header 2, and the outflow ports 6-2, 4 each having an even number are located in the other side of the center line B-B. Similarly, inflow ports 7-1, 3, 5
25 are located in one side of the center line B'-B' of the outlet header 4 and inflow ports 7-2, 4 are located in the other side of the center line B'-B'.

A heat-exchange coil group 8 comprising a plurality of heat-exchange coils 8-1, 2, 3, 4, 5 (five pieces in this
30 embodiment) are located between the inlet header 2 and the outlet header 4. Each of the heat-exchange coils 8-1, 2, 3, 4, 5 has a different winding diameter and a common center line C-C, and is formed by winding a wire around a heat conduction pipe made from such a material as a copper tube,
35 a steel tube, a specific steel tube or the like in the conventional technology.

Of the heat-exchange coils constituting the group 8,



both edges of each of the heat-exchange coils 8-1, 3, 5 having an odd number respectively are linked to the outflow ports 6-1, 3, 5 each having an odd number of the inlet header 2 as well as to the inflow ports 7-1, 3, 5 the inflow ports 7-1, 3, 5 each having an odd number in the outlet header 4 respectively. Both edges of heat-exchange coils 8-2, 4 each having an even number are linked to the outflow ports 6-2, 4 each having an even number in the inlet header 2 as well as to the inflow ports 7-2, 4 each having an even number in the outlet header 4 respectively. As described above, both edges of each of the heat-exchange coils 8-1, 3, 5 and 8-2, 4 are alternately linked to both sides of a center line B-B of the inlet header 2 as well as of the outlet header 4, and because of this configuration, a fluid flowing out from the inlet header 2 through the heat-exchange coils 8-1, 3, 5 and 8-2, 4 flows in a direction opposite to a flowing direction of a fluid flowing into the outlet header 4.

The heat-exchange coil assembly 1 as described above is installed inside a drum section 20 in which a second heat-exchange medium 27 comprising a gas or a liquid for a heat exchanger 21 shown in Fig. 25 and Fig. 26 described below is accommodated. A first heat-exchange medium comprising a gas or a liquid for exchanging heat with the second heat-exchange medium 27 is introduced as a descending flow through the inlet tube 3 into a drum section 22. In this step, the first heat-exchange medium flows through the outflow ports 6-1, 2, 3, 4, 5 in the outlet header 2 into the heat-exchange coils 8-1, 2, 3, 4, and 5, and flows upward in a spiral form in these heat-exchange coils 8-1, 2, 3, 4, and 5.

The first heat-exchange medium exchanges heat with the second heat-exchange medium in the drum section 22 via a wall thereof when flowing in the heat-exchange coils 8-1, 2, 3, 4, and 5, and further flows via the inflow ports 7-1, 2, 3, 4 and 5 into the outlet header 4, and then is discharged through the outlet tube 5 from the drum 22 and sent to a



load.

With the heat-exchange coil assembly 1 as described above, in the heat-exchange coils 8-1, 2, 3, 4, and 5 adjacent to each other in the winding section, of the outflow ports 6-1, 2, 3, 4, 5 and inflow ports 7-1, 2, 3, 4, 5, those having an odd number and those having an even number are located in opposite sides of the center line B-B and B'-B' of the inlet header 2 as well as of the outlet header 4, so that the heat-exchange coils 8-1, 2, 3, 4, and 5 adjoining to each other in this linking section are separated from each other.

Because of the configuration, as shown in Fig. 3, different from a heat-exchange coil assembly based on the conventional technology, an additional space for welding 2a is not required, and a pitch between adjoining two ones of the heat-exchange coils 8-1, 2, 3, 4, and 5 can be made equal to an outer diameter d of each of the heat-exchange coils 8-1, 2, 3, 4, and 5. In this embodiment, there are five heat-exchange coils 8, but the configuration is not limited to this one, and the heat exchange efficiency can freely be set by selecting a number of heat-exchange coils according to the necessity, which makes it possible for the heat-exchange coils to be applied in heat exchangers having various sizes from a small scale up to a large scale.

Fig. 4, Fig. 5, and Fig. 6 show outlines of second, third, and fourth embodiments of the present invention, and in each of these embodiments, the inlet tube 3 is located outside of the heat-exchange coil group 8 (in the outer side from a coil having the maximum winding diameter), and the outlet tube 5 is located inside the heat-exchange coil group 8 (in the inner side from a coil having the minimum winding diameter).

In the third embodiment shown in Fig. 5, the inlet tube 3 is located inside the heat-exchange coil group 8. In the fourth embodiment shown in Fig. 6, the inlet tube 3 and outlet tube 5 are located outside the heat-exchange coil group 8. As described above, As described above, the inlet



tube 3 and outlet tube 5 are located in various modes. These embodiments are different from the first embodiment only in the points described above, so that detailed description thereof is omitted herein.

5 Fig. 7 and Fig. 8 show a fifth embodiment of the present invention, and this embodiment is different from the first to fourth embodiments in the point that both the inlet header 2 and outlet header 4 are located in one side of the center line C-C of the heat-exchange coil group 8. Because
10 of the arrangement described above, a winding number in the heat-exchange coil group 8 is n (n : integral number).

A number of turns in a heat-exchange coil group in the first to fourth embodiments of the present invention is $n + 0.5$, while that in the fifth embodiment is $n - 0.5$, which
15 saves a material for the heat-exchange coil, and fifth embodiment is different from the first to fourth embodiments also in this point, but is the same as the first to fourth embodiment in other points, so that detailed description thereof is omitted herein.

20 Fig. 9 and Fig. 10 each show a sixth embodiment of the present invention, and in this embodiment, first and second headers 2-1, 2 are provided in parallel to each other in the inlet tube 3, and the outflow ports 6-2, 4 each having an even number are provided in the second inlet header 2-2.
25 Similarly, first and second outlet headers 4-1, 2 are provided in parallel to each other in the outlet tube 5, and the inflow ports each having an odd number are provided in the first inlet header 4-1, while the inflow ports each having an even number are provided in the second inlet
30 header 4-2.

Of the heat exchange coils 8-1, 2, 3, 4, and 5, both of the heat-exchange coils 8-1, 3, and 5 each having an odd number are linked to the inflow ports 6-1, 3, 5 each having an odd number in the first inlet header 2-1 as to the inflow
35 ports 7-1, 3, 5 each having an odd number in the first inlet header 4-1 respectively, and both edges of the heat-exchange coils 8-2, 4 each having an even number are linked to the



outflow ports 6-2, 4 each having an even number of the second inlet header 2-2 and to the inflow ports 7-2, 4 of the second outlet header 4-2 respectively.

As the heat-exchange coils 8-1, 2, 3, 4, and 5 are linked to the first and second inlet headers 4-1, 4-2 as well as to the first and second outlet headers 4-1 and 4-2 as described above, a flowing direction of a fluid in the heat-exchange coils 8-1, 2-, 3, 4, 5 is, different from that in each of the first to fourth embodiments, the same as that in the embodiments, but a pitch P between each of the heat-exchange coils 8-1, 2, 3, 4, 5 and each of the heat-exchange coils 8-1, 2, 3, 4, 5 in a linking section between the first and second inlet headers 2-1, 2 and the first and second outlet headers 4-1, 2 is the same as that in the first to fourth embodiments, and an additional space for welding a is not required to be provided, and the pitch P may be equal to an outer diameter d of each of the heat-exchange coils 8-1, 8-2, 8-3, 8-4, and 8-5.

Fig. 11 shows a seventh embodiment of the present invention, and this embodiment is the same as the sixth embodiment shown in Fig. 9 and Fig. 10 in the point that the first and second inlet headers 2-1, 2 are provided in the inlet tube 3, but is different from the sixth embodiment in the point that the inlet headers 2-1, 2 and outlet headers 4-1, 2 are linked with different heat-exchange coils 8-1, 2 respectively, and there is no different point other than that described above, and although there are two pairs of headers 2-1, 2 and headers 4-1, 2 and two heat-exchange coils 8-1, 2, a more number of pairs may be provided in this embodiment.

Fig. 12, 13, 14 each show an eighth embodiment of the present invention, and in this embodiment, edge sections of the first inlet header 2-1 and second inlet header 2-2 and edge sections of the first outlet header 4-1 and second outlet header 4-2 in the second embodiment shown in Fig. 4 as well as in the third embodiment shown in Fig. 5 are linked to each other and closed with linking plates 11 and



12, and further the first and second inlet tubes 3-1, 2 and first and second outlet tubes 5-1, 2 are provided therein.

Because of the configuration as described above, the first inlet tube 3-1 and first outlet tube 5-1 are provided outside the second inlet tube 3-2 and second inlet tube 5-2, and the first inlet tube 3-1 and first outlet tube 5-1 inlet or outlet a fluid for one load system X, while the second inlet tube 3-2 and second inlet tube 5-2 inlet and outlet a fluid for the other load system Y.

In this embodiment, the heat-exchange coils 8-1, 2, 3, 4, 5 communicated to the load system X and the heat-exchange coils communicated to the load system Y may have either different or identical coil lengths or coil diameters respectively, and the coil length and coil diameter are decided according to calorie required in each of the load systems X and Y.

Fig. 15 and Fig. 16 each show a ninth embodiment of the present invention, and in this embodiment, two sets of the heat-exchange coil assembly according to the sixth embodiment shown in Fig. 9 are combined to respond to two load systems X and Y simultaneously. In this embodiment, there are provided the first and second input tubes 3-1, 2 and first and second outlet tubes 5-1, 2, and edge sections of the first input headers 2-1, 2 and second inlet headers 2-3, 4 in the first and second inlet tubes 3-1, 2 and edge sections of the first inlet headers 4-1, 2 and second outlet headers 4-3, 4 are linked to each other and closed with the linking plates 11, 12 respectively.

Also in this embodiment, like in the eighth embodiment, a coil length and a coil diameter of each of the heat-exchange coils 8-1, 2, 3, 4, and 5 communicated to the load system X may be either equal to or different from those of each of the heat-exchange coils 8-6, 7, 8, and 9 communicated to the load system Y, and the factors are decided according to a calorie required in the load system X or Y.

Fig. 17 and Fig. 18 each show a tenth embodiment of the present invention, and in this embodiment, like in the first



embodiment, the inlet header 2 is provided at a lower edge section of the inlet tube 3 in a posture substantially perpendicular thereto, and also the inlet header 4 is provided at a lower edge section of the outlet tube 5 in a posture substantially perpendicular thereto.

The inlet tube 3 and input header 2 and outlet tube 5 and outlet header 4 are adjoining to and provided in parallel to each other, and inflow ports 6-1, 2, 3 are provided in the inlet header 2 and inflow ports 7-1, 2, 3 in the outlet header 4 respectively. And, the inflow ports 6-1, 2, 3 in the inlet-side header 2 and outflow ports 7-1, 2, 3 in the outlet header 4 are linked with the heat-exchange coils 8-1, 2, 3 to each other respectively, and heat exchange between fluids is performed line in other embodiments.

Fig. 19 and Fig. 20 each show an eleventh embodiment of the present invention, and this embodiment is different from the tenth embodiment only in the point that each of the heat-exchange coils 8-1, 2, 3 warps in an intermediate section thereof, and is not different therefrom in other points.

Fig. 21 and Fig. 22 each show a twelfth embodiment of the present invention, while Fig. 23 and Fig. 24 each show thirteenth and fourteenth embodiments of the present invention respectively, and in these embodiments, two sets of the inlet tube 3 and inlet header 2 and two sets of outlet tube 5 and outlet header 4 each in the first embodiment are provided, and further the first and second inlet tubes 3-1, 2, first and second inlet headers 2-1, 2, and the first and second outlet tubes 5-1, 2 and first and second outlet headers 4-1, 2 are provided so that the sets are provided with a space therebetween in the peripheral direction with the heat-exchange coils 8-1, 2 provided in the inner side and heat-exchange coils 8-3, 3 in the outer side, and both edges thereof are linked to the first and second inlet headers 2-1, 2 as well as to the first and second outlet headers 4-1, 2 respectively.

Fig. 25 and Fig. 26 each show a heat exchanger 21 in



which the heat-exchange coil assembly 1 according to the present invention is applied, and in this heat exchanger 21, a furnace cylinder 23 is provided under a drum section 22 of this heat exchanger 11, and a furnace chamber 24 is provided therein. A combustor 25 is installed in the furnace chamber 24, operations of this combustor are controlled by a thermostat, a gas in the furnace chamber 24 is heated by a flame generated therein, the heated gas heats water in the drum section 22 via tube walls of the convector tubes 28, 29 to a preset temperature, and then the gas is discharged through a discharge pipe 31 to outside.

The drum section 22 is communicated via a conduit 32 to a water supply tank 33 with a ball tap 34 provided in the water supply tank 33, and water supply is performed via a water supply pipe so that a liquid surface of water reserved therein is kept at a constant level. A gas chamber 37 is formed above a liquid surface in the drum section 22, and a gas in this gas chamber 37 is released to atmosphere via a conduit 38, the water supply tank 33, and a release pipe 39. With this construction, the reserved water 27 is heated under a pressure lower than the atmospheric pressure, and also the temperature is kept below the boiling point (100°C). In this example, the heat-exchange coil assembly 1 is connected to a load system such as a heating system, a hot-water supply unit, a bath, or a swimming pool not shown herein.

The embodiments above were described only for understanding of the present invention, and the present invention is not limited to the embodiments, and various configurations are allowable in which, for instance, outlet tubes and inlet tubes are used in the reverse mode, a heating medium and a heat-receiving medium are used reversely, or a heat exchanger using the heat-exchange coil assembly therein is not of an upright type, but of a flat type.

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WHAT IS CLAIMED IS:

1. A heat-exchange coil assembly comprising:
a medium inletting member having an inlet tube and an inlet header each for inletting a heat-exchange medium;
a medium outletting member having an outlet tube and an outlet header each for outletting a heat-exchange medium; and a plurality of heat-exchange coils each communicating the inlet header to the outlet header and having a different winding diameter; said heat-exchange coil assembly accommodated in a drum section of a heat exchanger; wherein the heat-exchange coils have a common center line and are alternately lined to opposite sides of the center lines of the headers.
2. The heat-exchange coil assembly according to Claim 1; wherein the inlet header and the outlet header are located in both sides of the common center line of the heat-exchange coils.
3. The heat-exchange coil assembly according to Claim 1; wherein the inlet header and the outlet header are located in one side of the common center line of the heat-exchange coils.
4. The heat-exchange coil assembly according to Claim 1; wherein a plurality of inlet headers and a plurality of outlet headers are linked to one inlet tube and to one outlet tube respectively, and the inlet headers and outlet headers are linked to each other with the heat-exchange coils respectively.
5. The heat-exchange coil assembly according to Claim 2; wherein the inlet tube and outlet tube comprise first and second inlet tubes and first and second outlet tubes respectively; tips of inlet headers of the first and second inlet tubes are not-communicably jointed to each other and also tips of outlet headers of the first and second outlet tubes are not-communicably jointed, and further heat-exchange coil groups are located between the inlet header of the first inlet tube and the outlet header of the first outlet tube





and between the inlet header of the second inlet tube and the outlet header of the second outlet tube respectively.

6. The heat-exchange coil assembly according to Claim 5; wherein a heat-exchange coil group for the first inlet tube and first outlet tube is different from a heat-exchange coil groups for the second inlet tube and second outlet tube in terms of the coil length and coil diameter.

7. The heat-exchange coil assembly according to any of Claims 1 to 6; wherein the heat-exchange coils are alternately linked to the first inlet header and second inlet header and also alternately linked to the first and second outlet headers.

8. The heat-exchange coil assembly according to Claim 7; wherein tips of the first and second inlet headers of the first inlet tube are not-communicably jointed to the first and second inlet headers of the second inlet tube, tips of the first and second outlet headers of the first outlet tube are not-communicably jointed to tips of the first and second outlet headers of the second outlet tube, and heat-exchange coil groups are located between the first and second inlet headers of the first inlet tube and the first and second outlet headers of the first outlet tube and between the first and second inlet headers of the second inlet tube and the first and second outlet headers of the second outlet tube respectively.

9. The heat-exchange coil assembly according to Claim 8; rainwater collecting sections are formed in roof sections of construction frames for a heat-exchange coil group for the first inlet tube and first outlet tube as well as for a heat-exchange coil group for the second inlet tube and second outlet tube, and the two heat-exchange coil groups are different from each other in terms of the coil length and coil diameter.

10. A heat-exchange coil assembly comprising:

a medium inletting member having an inlet tube and an inlet header each for inletting a heat-exchange medium;

a medium outletting member having an outlet tube and an





outlet header each for outletting a heat-exchange medium;
and

5 a plurality of heat-exchange coils each communicating
the inlet header to the outlet header and having a different
winding diameter; wherein the medium inletting member and
medium outletting member are located adjacent to each other.

10 11. The heat-exchange coil ssembly according to Claim 10;
wherein an inlet header and an outlet header comprise cham-
bers formed in a single tube and separated from each other
with a partition.

12. The heat-exchange coil assembly according to Claim 10
or Claim 11; wherein the heat-exchange coils have the same
length.

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