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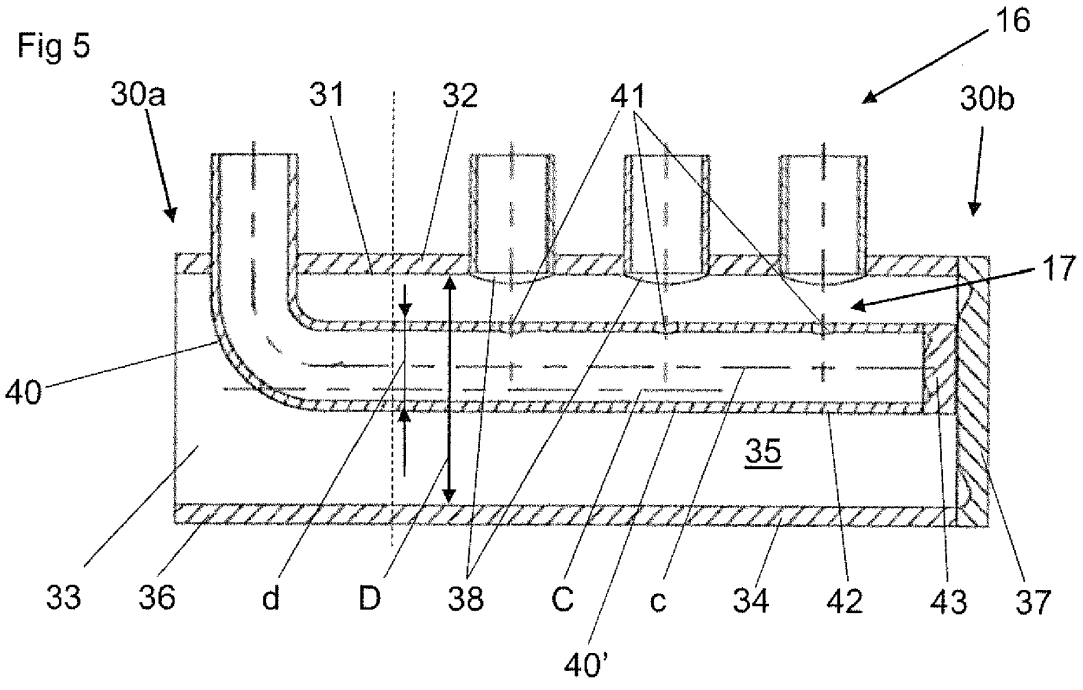
(54) **A HEADER DEVICE FOR A HEAT EXCHANGER SYSTEM, A HEAT EXCHANGER SYSTEM, AND A METHOD OF HEATING A FLUID**

(57) A header device (4), a heat exchanger system comprising a tube arrangement for a fluid to be heated, and a method of heating a fluid are disclosed. The header device comprises a header (30) comprising an inlet portion (31) with an header inlet (33) for a first fluid, and an outlet portion (32) with a header outlet (16), which extends through a wall (34) of the outlet portion and is connected to the tube arrangement. The header permits the first fluid to enter an inner space (35) of the outlet portion and to flow from the inner space to the tube arrangement. The header device comprises an injector pipe (40) connected to the header and arranged to inject a second fluid into the header to force the first fluid through the header outlet and into the tube arrangement together with the second fluid, the fluid to be heated comprising the first and second fluids.

Fig 5



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Description

TECHNICAL FIELD OF THE INVENTION

[0001] The present invention refers to a header device for a heat exchanger system, for instance for a so called boiler for heating of water to be evaporated. More specifically, the present invention refers to a header device for a heat exchanger system comprising a tube arrangement configured to convey a fluid to be heated, the header device comprising a header comprising an inlet portion and an outlet portion communicating with each other,
wherein the inlet portion comprises a header inlet for a first fluid,
wherein the outlet portion comprises a wall surrounding an inner space,
wherein the outlet portion comprises a header outlet, which extends through the wall and is configured to be connected to the tube arrangement,
wherein the header is configured to permit the first fluid to enter the inner space via the header inlet, and to flow from the inner space to the tube arrangement via the header outlet.

[0002] The present invention also refers to a heat exchanger system comprising a header device.

[0003] Furthermore, the present invention refers to a method of heating a fluid in a heat exchanger system comprising a channel, a tube arrangement arranged inside the channel and a header having a header inlet and a header outlet connected to the tube arrangement, the method comprising conveying a high temperature fluid through the channel, and supplying a first fluid to the header via the header inlet.

BACKGROUND OF THE INVENTION AND PRIOR ART

[0004] US-4,351,277 discloses an economizer of the type having a vertically extending cylindrical casing in which is mounted a plurality of spiral coils arranged in parallel to each other in concentric relation with respect to the central vertical axis of the cylindrical casing. The spiral coils are in the form of finned tubes. A heat exchange fluid is conducted through the spiral coils whereby the coils can extract heat from exhaust gases passing upwardly through the economizer from a boiler. The economizer comprises an inlet header comprising a pipe which receives the fluid to be heated. The pipe has an outer wall and encloses an inner space. Seven outlet openings extend through the wall and are connected to a respective one of the spiral coils.

[0005] In the prior art, it is known to use different steam systems for generating steam for generation of heat and/or power. Two main types of steam systems include steam systems with forced circulation and steam systems with natural circulation.

[0006] Steam systems with forced circulation may comprise a heat exchanger, for instance a boiler, for heating and evaporating water by means of a heat source, such as flue gases, solar energy, etc. The heated and evaporated water may be conveyed from the heat exchanger to a so called steam drum, in which water is separated from the steam and collected in a lower part of the steam drum. The steam may then be conveyed from the steam drum to a steam consumer, for instance a heat exchanger or steam turbine. In the steam consumer, heat is recovered from the steam and condensed water may be collected in a so called hot well. By means of a feed water pump, the water from the hot well may be conveyed back to the steam drum. The water collected in the steam drum may be conveyed to a water inlet of the heat exchanger via an inlet conduit by means of a circulation pump. The circulation pump may raise the pressure of the water by for instance about 1 bar, thereby forcing the water into the heat exchanger, where the water is again evaporated.

[0007] Steam systems with natural circulation may differ from the steam systems with forced circulation in that the circulation pump is replaced by a long vertical inlet conduit, a so called down comer. The steam drum should then be arranged at a level well above the water inlet of the heat exchanger. For instance a height of the down comer of approximately 10 m may create a pressure increase of about 1 bar, which may be sufficient to force the water into the heat exchanger and maintain the circulation in the steam system.

SUMMARY OF THE INVENTION

[0008] The object of the present invention is to provide an alternative solution to the down comer and the circulation pump. Especially, it is aimed at an alternative solution, which maintain an efficient circulation without the need for a circulation pump and/or a down comer.

[0009] This object is achieved by the header device initially defined which is characterized in that the header device comprises an injector pipe connected to the header and arranged to inject a second fluid into the header to force the first fluid through the header outlet and into the tube arrangement together with the second fluid, the fluid to be heated comprising the first and second fluids.

[0010] By means of such a header device, the second fluid will operate to force the first fluid into the tube arrangement by means of an ejector action. Consequently, it may be dispensed with a circulation pump for the first fluid. Furthermore, there is no need for a long down comer, which means that the steam drum may be positioned relatively closely to the tube arrangement. According to an embodiment of the invention, the tube arrangement comprises a number of tubes for the fluid to be heated, wherein the header outlet comprises a number of openings through the wall of the outlet portion, and wherein each opening is configured to be connected to a respective one of the tubes. The wall of the outlet portion around the openings may be even, especially without any projecting parts extending into the inner space from the wall of the outlet portion.

[0011] The number of tubes of the tube arrangement may be one single tube or a plurality of tubes. For instance, the number of tubes may be 2, 3, 4, 5, 6, 7, 8 or even more tubes.

[0012] The number of openings through the wall of the outlet portion may, or may not, be the same as the number of tubes. Thus, one or more of the openings may be connectable to a single one of the tubes and vice versa.

[0013] According to a further embodiment of the invention, a first portion of the injector pipe comprises an injector outlet and extends inside the inner space of the header. The injector pipe with the injector outlet in the inner space may further increase the circulation of the first and second fluids in the tube arrangement.

[0014] According to a further embodiment, the injector outlet comprises a number of holes through a wall of the injector pipe. The wall of the injector pipe around the holes may be even, especially without any projecting parts extending into the inner space from the wall of the injector pipe. The holes may thus be just holes having no further elements defining the injector outlet.

[0015] The number of holes may be one single hole or a plurality of holes, for instance the injector outlet may comprise 2, 3, 4, 5, 6, 7, 8 or more holes through the wall of the feed pipe.

[0016] The holes of the injector outlet may have different areas, or equal areas. By selecting the area and position of each hole, it may be possible to control the flow to each tube of the tube arrangement, and to even out the flow distribution to the different tubes. This may be advantageous since the length, and thus the flow resistance, of the tubes may be different.

[0017] According to a further embodiment of the invention, the number of holes through the wall of the injector pipe may differ from the number of openings through the wall of the outlet portion. Especially, the number of holes through the injector pipe may be less than the number of openings through the wall of the outlet portion.

[0018] According to a further embodiment of the invention, the holes of the injector outlet face the openings of the outlet portion. Center axes of the holes and the openings may, or may not, coincide.

[0019] According to a further embodiment of the invention, the first portion of the injector pipe is arranged separated from the wall of the inner space. Thus there is a radial distance between the injector outlet and the header outlet. Especially, there may be a radial distance between the holes through the wall of the first portion of the injector pipe and the openings through the wall of the outlet portion. The radial distance may provide a free flow for the first fluid from the header inlet to the tube arrangement.

[0020] According to a further embodiment of the invention, the header outlet has a first flow area and the injector outlet has a second flow area, wherein the first flow area is larger than the second flow area. Especially, the area of each opening through the wall of the outlet portion may be larger than the area of each hole through the wall of the injector pipe. The larger flow area of the header outlet in comparison with the flow area the injector outlet may permit the flow of the first fluid to be larger than the flow of the second fluid. A small flow of the second fluid may thus be used to circulate a large flow of the first fluid.

[0021] According to a further embodiment of the invention, a longitudinal center axis of the first portion of the injector pipe extends in parallel to a longitudinal center axis of the outlet portion of the header. The two parallel axes may permit holes and the openings to be aligned with each other.

[0022] According to a further embodiment of the invention, the inlet portion extends to a first end of the header and the outlet portion extends to a second end of the header, wherein the second end is closed. The fluid entering the header thus has to pass out through the header outlet, i.e. through any one of the openings through the wall of the outlet portion.

[0023] According to a further embodiment of the invention, the injector pipe extends through the inlet portion into the inner space.

[0024] According to a first embodiment, the injector pipe extends through a wall of the inlet portion. The wall of the inlet portion may have the same transversal shape as, and be concentric with, the wall of the outlet portion.

[0025] According to a second alternative embodiment, the inlet extends through the first end.

[0026] According to a further embodiment of the invention, the injector pipe has a bottom end in the inner space, wherein the bottom end is closed.

[0027] The object is also achieved by the heat exchanger system comprising

a channel for a high temperature fluid,

a tube arrangement arranged in the channel and configured to convey a fluid to be heated, wherein the high temperature fluid is in heat exchanging relation with the fluid in the tube arrangement, and

a header device as defined above, wherein the header outlet is connected to the tube arrangement.

[0028] According to a further embodiment of the invention, the tube arrangement comprises an outlet member and a number of tubes connected to and extending between the header outlet and the outlet member. The number of tubes may be one single tube or a plurality of tubes, for instance 2, 3, 4, 5, 6, 7, 8 or even more tubes.

[0029] According to a further embodiment of the invention, the heat exchanger system comprises

an outlet conduit configured to discharge the fluid from the tubes via the outlet member,

a steam drum connected to the tube arrangement via the outlet conduit and configured to receive steam and water of the fluid that has been heated from the tube arrangement,

a steam consumer connected to the steam drum via a steam conduit, and configured to receive steam from the steam drum,

a hot well connected to the steam consumer and configured to receive water from the steam consumer,

an inlet conduit connecting the steam drum to the header

inlet and configured to convey the first fluid from the steam drum to the header inlet, and
a feed fluid conduit connecting the hot well to the injector pipe and configured to convey the second fluid from the hot well to the injection pipe.

[0030] In such a heat exchanger system, the feed fluid conduit connected to the injector pipe of the header device may replace both the down comer and the circulation pump of the prior art. According to a further embodiment of the invention, the heat exchanger system comprises a feed water pump for forcing the second fluid from the hot well to the injector pipe.

[0031] The object is also achieved by the method initially defined, which comprises
injecting a second fluid into the header via an injector pipe connected to the header, thereby forcing the first fluid through the header outlet and into the tube arrangement together with the second fluid, the fluid to be heated comprising the first and second fluids, and
conveying the fluid to be heated through the tube arrangement in heat exchanging relation with the high temperature fluid in the channel.

[0032] According to a further embodiment of the invention, the method further comprises
conveying steam and water of the fluid that has been heated from the tube arrangement to a steam drum,
conveying steam from the steam drum to a steam consumer, conveying water from the steam consumer to a hot well, conveying the first fluid from the steam drum to the header inlet, and
conveying the second fluid from the hot well to the injector pipe.

BRIEF DESCRIPTION OF THE DRAWINGS

[0033] The present invention is now to be explained more closely through a description of different embodiments and with reference to the drawings attached hereto.

Fig. 1 discloses schematically a diagram of a heat exchanger system according to a first embodiment of the invention.

Fig. 2 discloses schematically a vessel and a tube arrangement of the heat exchanger system in Fig. 1.

Fig. 3 discloses schematically a view from above of a header device of the heat exchanger system in Fig. 1.

Fig. 4 discloses an end view of the header device in Fig. 3.

Fig. 5 discloses schematically a longitudinal section along the lines V-V in Fig. 3.

Fig. 6 discloses schematically a view from above of a header device according to a second embodiment of the invention.

Fig. 7 discloses schematically an end view of the header device in Fig. 6.

Fig. 8 discloses schematically a longitudinal section along the line IIIV-IIIV in Fig. 6.

DETAILED DESCRIPTION OF DIFFERENT EMBODIMENTS

[0034] Fig. 1 discloses a heat exchanger system S comprising a vessel 1. The vessel 1 comprises a channel 2 for a high temperature fluid. In the embodiments disclosed, the high temperature fluid is flue gases from a burner (not disclosed). The heat exchanger system S also comprises a tube arrangement 3 arranged inside the channel 2 and configured to convey a fluid to be heated. The high temperature fluid, i.e. the flue gases, is in heat exchanging relation with the fluid in the tube arrangement 3. The tube arrangement comprises a header device 4 and an outlet member 5.

[0035] Furthermore, the vessel 1 comprises an inlet 6 for the high temperature fluid into the channel 2 and an outlet 7 for the high temperature fluid out from the channel 2. The channel 2 has a longitudinal center axis x, see Fig. 2, which extends through the inlet 6 and the outlet 7.

[0036] As can be seen in Fig. 2, the tube arrangement 3 comprises a number of tubes, in the embodiments disclosed four tubes 11, 12, 13, 14 provided in the channel 2 and configured to convey the fluid to be heated.

[0037] The tubes 11-14 may optionally be provided with fins or other surface enlarging elements (not disclosed in the figures).

[0038] The tubes 11-14 extend between and are connected to the header device 4 and the outlet member 5.

[0039] Each tube 11-14 of the tube arrangement 3 comprises or is formed as a helical coil having a plurality of turns. The helical coils of the tubes 11-14 are concentric with the longitudinal center axis x. The tubes 11-14 are arranged one within the other as can be seen in Fig. 2.

[0040] The heat exchanger system S also comprises an outlet conduit 20 extending from the outlet member 5 to a steam drum 21. The outlet conduit 20 is configured to convey the fluid which has been heated in the tube arrangement 3 from the outlet member 5 to the steam drum 21. This fluid may consist of a mixture of steam and water, wherein the steam is collected in an upper part of the steam drum 21 and the water is collected in a lower part of the steam drum 21 as is illustrated in Fig. 1.

[0041] Furthermore, the heat exchanger system S comprises a steam conduit 22 extending between and connecting the steam drum 21 with a steam consumer 23. The steam from the steam drum 21 is thus conveyed to the steam consumer 23 via the steam conduit 22. The steam consumer 23 could be any apparatus or equipment where steam is utilized, for instance a heat exchanger or a steam turbine.

[0042] Furthermore, the heat exchanger system S comprises a hot well 24 connected to the steam consumer 23. The hot well 24 may be provided adjacent to the steam consumer 23. The hot well 24 is configured to receive condensed water from the steam consumer 23.

[0043] An inlet conduit 25 of the heat exchanger system S connects the steam drum 21 to the header device 4 and is configured to convey water from the steam drum 21, herein also referred to as first fluid, to the header device 4.

[0044] A feed fluid conduit 26 of the heat exchanger system S connects the hot well 24 to the header device 4 and is configured to convey the water from the hot well 24, herein also referred to as second fluid, as a feed fluid or water to the header device 4.

[0045] Furthermore, the heat exchanger system S comprises a feed water pump 27 provided on the feed fluid conduit 26 for forcing the second fluid from the hot well 24 to the header device 4.

[0046] The header device 4 is now to be described more closely with reference to Figs. 3-5. The header device 4 according to the first embodiment comprises a header 30 comprising an inlet portion 31 and an outlet portion 32. The inlet portion 31 and the outlet portion 32 are separated by a dashed line in Fig. 3. The inlet portion 31 comprises a header inlet 33 for the first fluid fed from the steam drum 21 through the inlet conduit 25. The outlet portion 32 comprises a wall 34 surrounding an inner space 35. The outlet portion 32 has a longitudinal center axis C and an inner diameter D.

[0047] In the first embodiment, the outlet portion 32 is circular cylindrical and the wall 34 of the outlet portion 32 continues into the inlet portion 31, and forms a wall 36 of the inlet portion 31. Thus the walls 34 and 36 may be formed by one cylinder.

[0048] The inlet portion 31 extends to a first end 30a of the header 30. The outlet portion 32 extends to a second end 30b of the header 30. The second end 30b is closed by means of an end element 37.

[0049] The outlet portion 32 comprises a header outlet 16, which extends through the wall 34 of the outlet portion 32 and is connected to the tube arrangement 3.

[0050] As mentioned above, the tube arrangement 3 comprises four tubes 11-14 for the fluid to be heated. The header outlet 16 may comprise a corresponding number of openings 38 extending through the wall 34 of the outlet portion 32, each opening 38 being connected to a respective one of the tubes 11-14. It should be noted that in Figs. 3-5, only three openings 38 are disclosed. However, it is clear that the header outlet 16 of the header 30 also may comprise four openings 38 arranged along a row as indicated in Figs. 3 and 5.

[0051] It is also to be noted that the tube arrangement 3 may comprise any number of tubes 11-14, for instance only one tube, or 2, 3, 4, 5, 6, 7, 8 or even more tubes. In any case, the header 30 comprises a header outlet 16 with a corresponding number of openings 38 for being connected to a respective one of the tubes 11-14 of the tube arrangement 3.

[0052] The header inlet 33 is connected to the inlet conduit 25, see Fig. 1. The header 30 is thus configured to permit the first fluid, i.e. water, from the steam drum 21 to enter the inner space 35 via the header inlet 33 and to flow from the inner space 35 to the tube arrangement 3 via the header outlet 16, i.e. via the openings 38 of the header outlet 16.

[0053] The header device 4 also comprises an injector pipe 40, connected to the header 30, for the second fluid fed from the hot well 24 through the feed fluid conduit 26, see Fig. 1. A first portion 40' of the injector pipe 40 extends into the inner space 35 as can be clearly seen in Fig. 5. The injector pipe 40 is configured to permit the supply of the second fluid to the inner space 35 in such a manner that the first fluid and the second fluid together are ejected into the tube arrangement 3 via the header outlet 16, i.e. via the openings 38. More particularly, when the second fluid is ejected from the injector pipe 40, the first fluid is forced through the header outlet 16 and into the tube arrangement 3 together with the second fluid. The fluid to be heated in the tube arrangement 3 thus comprises the first and second fluids.

[0054] To that end the first portion 40' of the injector pipe 40 comprises an injector outlet 17, which permits the supply of the second fluid to the inner space 35. The injector outlet 17 comprises a number of holes 41 extending through a wall 42 of the injector pipe 40. The injector pipe 40, at least in the area of the injector outlet 17 has a cylindrical, especially a circular cylindrical shape defining a longitudinal center axis c. The first portion 40' of the injector pipe 40 has an outer diameter d.

[0055] As can be seen in Fig. 5, the first portion 40' of the injector pipe 40 is positioned in the inner space 35 in such a way that there is a radial distance between the number of holes 41 and the number of openings 38. More specifically, the inner diameter D is greater than the outer diameter d, wherein the first portion 40' of the injector pipe 40 along its complete length is provided at a radial distance from an inner side of the wall 34 of the outlet portion 32.

[0056] The injector pipe 40 extends through the inlet portion 31 into the inner space 35. In the first embodiment, the injector pipe 40 extends through the wall 36 of the inlet portion 31 as can be seen in Figs. 3-5.

[0057] The injector pipe 40 has a bottom end 43 provided in the inner space 35. The bottom end 43 is closed. In the first embodiment, the bottom end 43 is arranged adjacent to the closed second end 30b of the header 30.

[0058] The header outlet 16 has a first flow area, which may be the total area of all openings 38. The injector outlet 17 has a second flow area, which may be the total area of all holes 41. The first flow area is larger than the second flow area. Especially, the area of each opening 38 may be larger than the area of each hole 41. The area of the holes 41 may be equal or different for the different holes 41.

[0059] The header outlet 16 is provided within an elongated area 44 of the wall 34 of the outlet portion 32. The elongated area 44 extends in parallel with the longitudinal center axis C. In the first embodiment, the long sides of the area 44 are tangent to the edges of the openings 38.

[0060] The elongated area 44 has a width α, see Fig.

3, i.e. an angular distance between the long sides. The width α is less than 60° with respect to the longitudinal center axis C, preferably less than 50° with respect to the longitudinal center axis C, more preferably less than 40° with respect to the longitudinal center axis C and most preferably less than 30° with respect to the longitudinal center axis C.

[0061] As can be seen in Fig. 3, all of the openings 38 are positioned within the elongated area 44. The injector outlet 17 faces the elongated area 44. Consequently, all of the holes 41 of the injector outlet 17 face the elongated area 44 and thus the openings 38.

[0062] In the first embodiment each of the holes 41 is positioned opposite to an opening 38 as can be clearly seen in Fig. 3. However, as mentioned above, the number of holes 41 may be less than the number of openings 38.

[0063] Moreover, in the first embodiment, the openings 38 are positioned along a line being parallel with the longitudinal center axis C. Also the holes 41 are positioned along this line being parallel with the longitudinal center axis C. In particular, it should be mentioned that the holes 41 may be displaced in relation to the openings 38 along this line, especially such that the openings 38 and the holes 41 are not pairwise aligned with each other.

[0064] During operation of the heat exchanger system S, water from the hot well 24, herein also referred to as the second fluid, will thus be fed into the injector pipe 40 by means of the feed water pump 27. The feed water pump 27 raises the pressure of the water from the hot well, thereby forcing the water out of the holes 41 of the injector outlet 17. The water ejected from the holes 41 will then bring the water from the steam drum 21, herein also referred to as the first fluid, to be ejected through the openings 38 together with the water from the holes 41. In such a way, circulation of the fluid between the steam drum 21 and the hot well 24 and the tube arrangement 3 will be maintained only by means of the power delivered to the feed water pump 27.

[0065] A second embodiment of the header device 4 is disclosed in Figs. 6-8. The same reference signs are used for elements having the same or corresponding functions in the embodiments disclosed. The header device 4 of the second embodiment differs from the header device 4 of the first embodiment in that the inlet portion 31 is curved, more particularly bent 90 degrees, whereas the injector pipe 40 is straight and extends in parallel with the longitudinal center axis C, although the longitudinal center axis c of the injector pipe 40 is displaced with respect to the longitudinal center axis C of the outlet portion 32 as in the first embodiment. In the first embodiment the injector pipe 40 was curved, more particularly bent 90 degrees, while the inlet portions 31 was straight.

[0066] As can be seen in Figs 5 and 8, the longitudinal center axis c of the first portion 40' of the injector pipe 40 is parallel with the longitudinal center axis C of the outlet portion 32. In the first and second embodiments, the longitudinal center axis c of the first portion 40' of the injector pipe 40 is displaced in a radial direction with respect to the longitudinal center axis C of the outlet portion 32. It should be noted, that the longitudinal center axis c of the first portion 40' of the injector pipe 40 may coincide with the longitudinal center axis C of the outlet portion 32.

[0067] The present invention is not limited to the embodiments disclosed but may be varied and modified within the scope of the following claims.

[0068] As an example, the holes 41 and the openings 38 need not be circular but may have any other shape.

Claims

1. A header device (4) for a heat exchanger system (S) comprising a tube arrangement (3) configured to convey a fluid to be heated, the header device (4) comprising a header (30) comprising an inlet portion (31) and an outlet portion (32) communicating with each other,
   wherein the inlet portion (31) comprises a header inlet (33) for a first fluid,
   wherein the outlet portion (32) comprises a wall (34) surrounding an inner space (35),
   wherein the outlet portion (32) comprises a header outlet (16), which extends through the wall (34) and is configured to be connected to the tube arrangement (3),
   wherein the header (30) is configured to permit the first fluid to enter the inner space (35) via the header inlet (33), and to flow from the inner space (35) to the tube arrangement (3) via the header outlet (16),
   characterized in
   that the header device (4) comprises an injector pipe (40) connected to the header (30) and arranged to inject a second fluid into the header (30) to force the first fluid through the header outlet (16) and into the tube arrangement (3) together with the second fluid, the fluid to be heated comprising the first and second fluids.

2. A header device (4) according to claim 1, wherein the tube arrangement (3) comprises a number of tubes (11-14) for the fluid to be heated, wherein the header outlet (16) comprises a number of openings (38) through the wall (34) of the outlet portion (32), and wherein each opening (38) is configured to be connected to one of the tubes (11-14).

3. A header device (4) according to claim 2, wherein a first portion (40') of the injector pipe (40) comprises an injector outlet (17) and extends inside the inner space (35) of the header (30).

4. A header device (4) according to claim 3, wherein the injector outlet (17) comprises a number of holes (41) through a wall (42) of the injector pipe (40).

5. A header device (4) according to claim 4, wherein

the holes (41) of the injector outlet (17) face the openings (38) of the outlet portion (32).

6. A header device (4) according to any of claims 3-5, wherein the first portion (40') of the injector pipe (40) is arranged separated from the wall (34) of the inner space (35).

7. A header device (4) according to any of claims 3-6, wherein the header outlet (16) has a first flow area and the injector outlet (17) has a second flow area, and wherein the first flow area is larger than the second flow area.

8. A header device (4) according to any of claims 3-7, wherein a longitudinal center axis (c) of the first portion (40') of the injector pipe (40) extends in parallel to a longitudinal center axis (C) of the outlet portion (32) of the header (30).

9. A header device (4) according to any one of the preceding claims, wherein the inlet portion (31) extends to a first end (30a) of the header (30) and the outlet portion (32) extends to a second end (30b) of the header (30), and wherein the second end (30b) is closed.

10. A heat exchanger system (S) comprising
a channel (2) for a high temperature fluid,
a tube arrangement (3) arranged in the channel (2) and configured to convey a fluid to be heated, wherein the high temperature fluid is in heat exchanging relation with the fluid in the tube arrangement (3), and
a header device (4) according to any one of the preceding claims, wherein the header outlet (16) is connected to the tube arrangement (3).

11. A heat exchanger system (S) according to claim 10, wherein the tube arrangement (3) comprises an outlet member (5) and a number of tubes (11-14) connected to and extending between the header outlet (16) and the outlet member (5).

12. A heat exchanger system (S) according to claim 11, wherein the heat exchanger system (S) comprises
an outlet conduit (20) configured to discharge the fluid from the tubes (11-14) via the outlet member (5),
a steam drum (21) connected to the tube arrangement (3) via the outlet conduit (20) and configured to receive steam and water of the fluid that has been heated from the tube arrangement (3),
a steam consumer (23) connected to the steam drum (21) via a steam conduit (22), and configured to receive steam from the steam drum (21),
a hot well (24) connected to the steam consumer (23) and configured to receive water from the steam consumer (23),
an inlet conduit (25) connecting the steam drum (21) to the header inlet (33) and configured to convey the first fluid from the steam drum (21) to the header inlet (33), and
a feed fluid conduit (26) connecting the hot well (24) to the injector pipe (40) and configured to convey the second fluid from the hot well (24) to the injector pipe (40).

13. A heat exchanger system (S) according to claim 12, wherein the heat exchanger system (S) comprises a feed water pump (27) for forcing the second fluid from the hot well (24) to the injector pipe (40).

14. A method of heating a fluid in a heat exchanger system comprising a channel (2), a tube arrangement (3) arranged inside the channel (2) and a header (30) having a header inlet (33) and a header outlet (16) connected to the tube arrangement (3),
the method comprising
conveying a high temperature fluid through the channel (2), supplying a first fluid to the header (30) via the header inlet (33),
the method being **characterized in** further comprising injecting a second fluid into the header (30) via an injector pipe (40) connected to the header (30) thereby forcing the first fluid through the header outlet (16) and into the tube arrangement (3) together with the second fluid, the fluid to be heated comprising the first and second fluids, and
conveying the fluid to be heated through the tube arrangement (3) in heat exchanging relation with the high temperature fluid in the channel (2).

15. A method according to claim 14, further comprising
conveying steam and water of the fluid that has been heated from the tube arrangement (3) to a steam drum (21),
conveying steam from the steam drum (21) to a steam consumer (23),
conveying water from the steam consumer (23) to a hot well (24),
conveying the first fluid from the steam drum (21) to the header inlet (33), and
conveying the second fluid from the hot well (24) to the injector pipe (49).

Fig 1

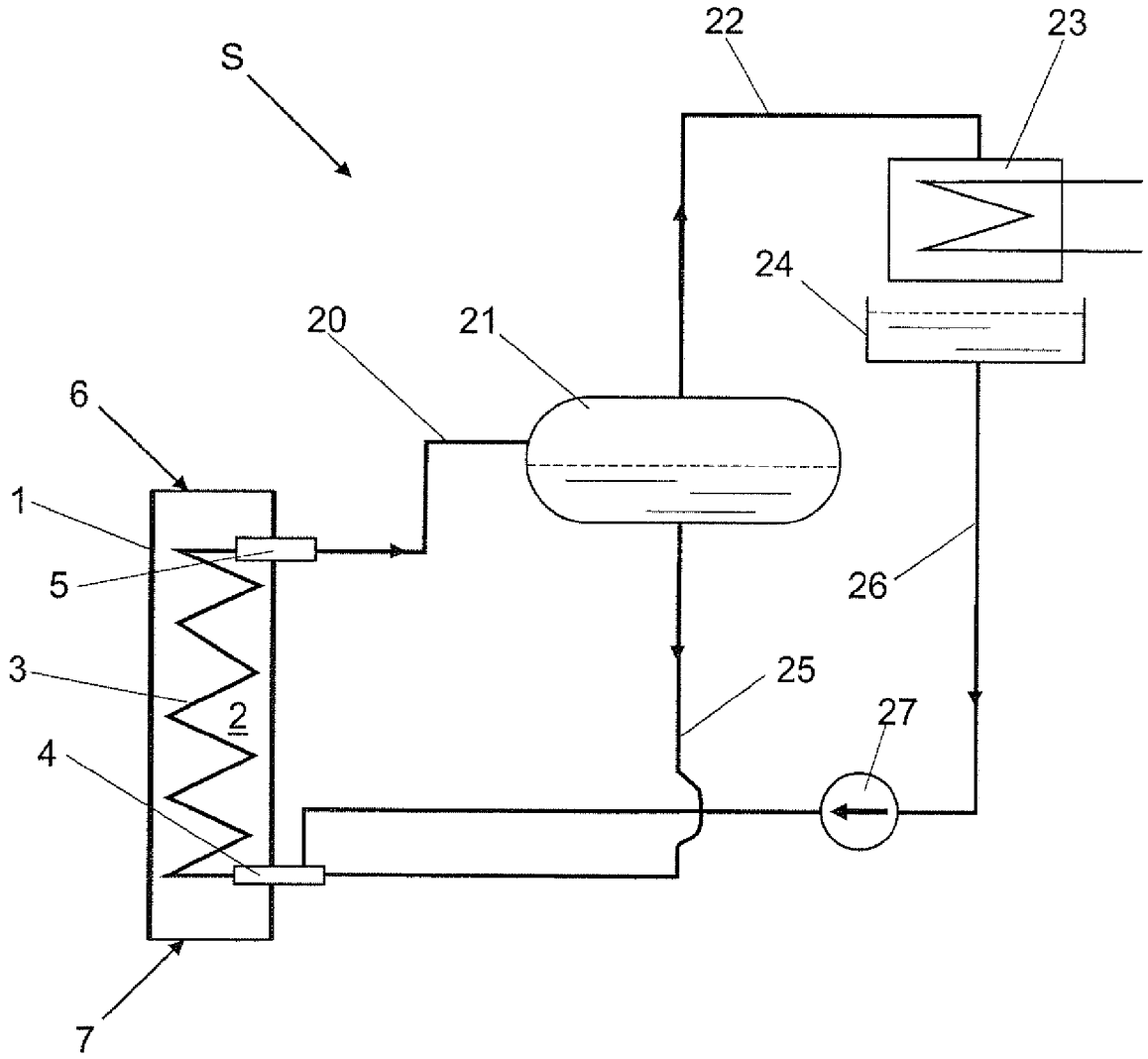


Fig 2

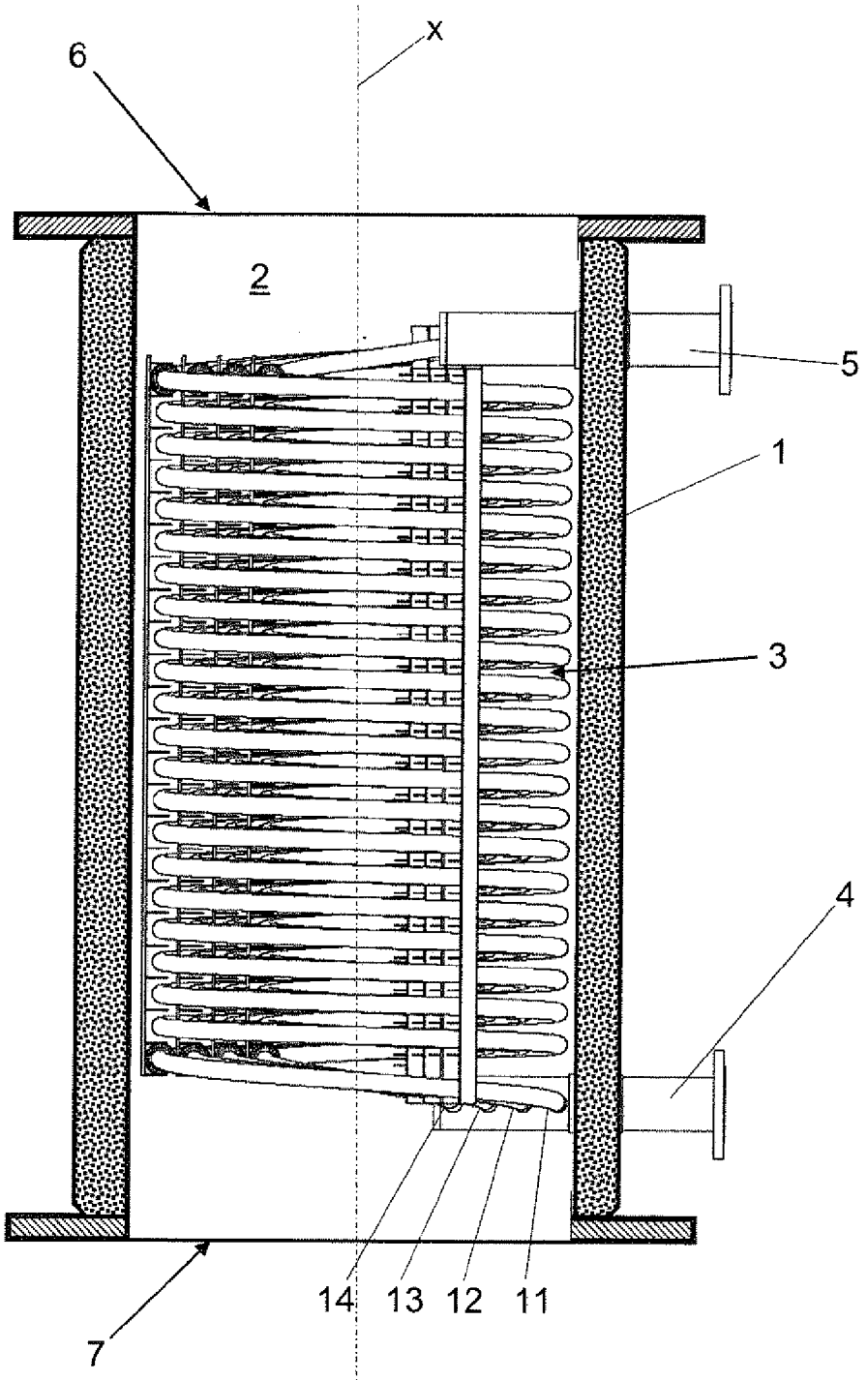


Fig 3

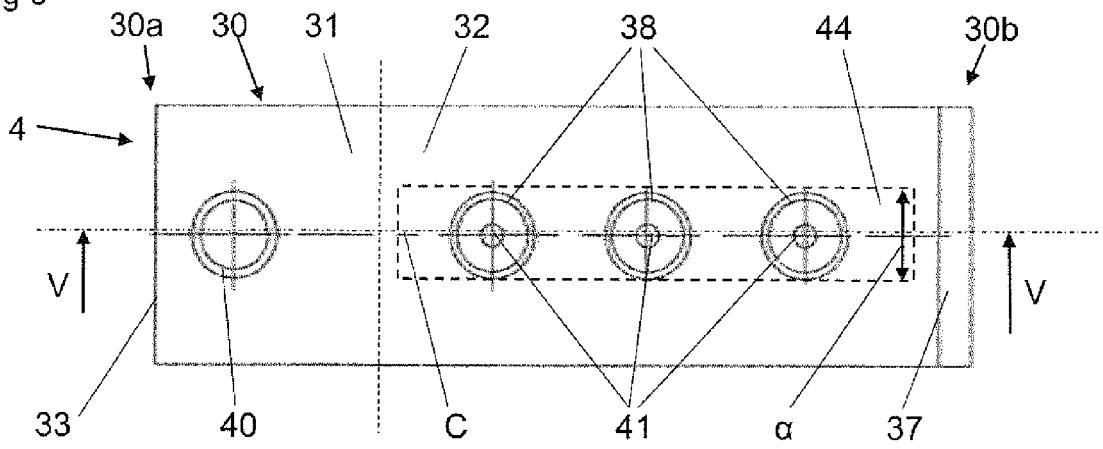


Fig 4

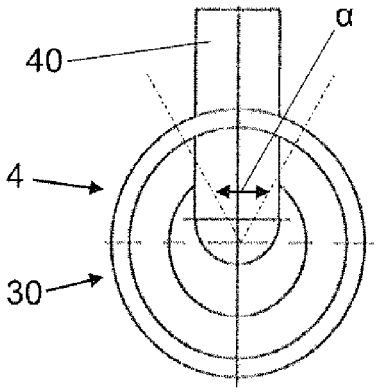


Fig 5

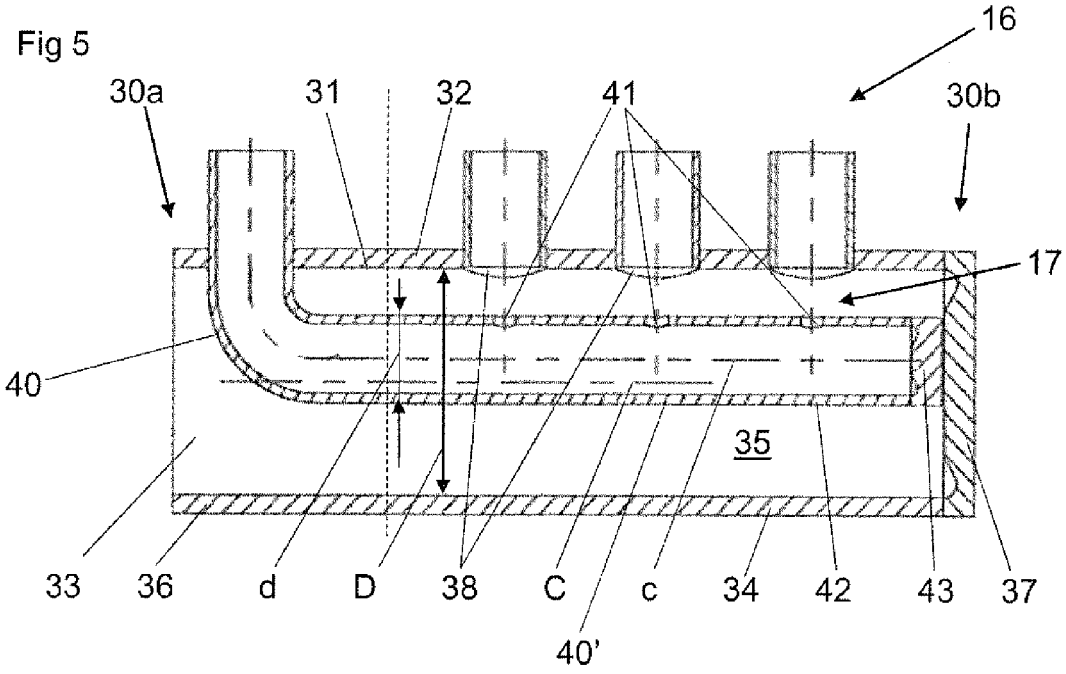


Fig 6

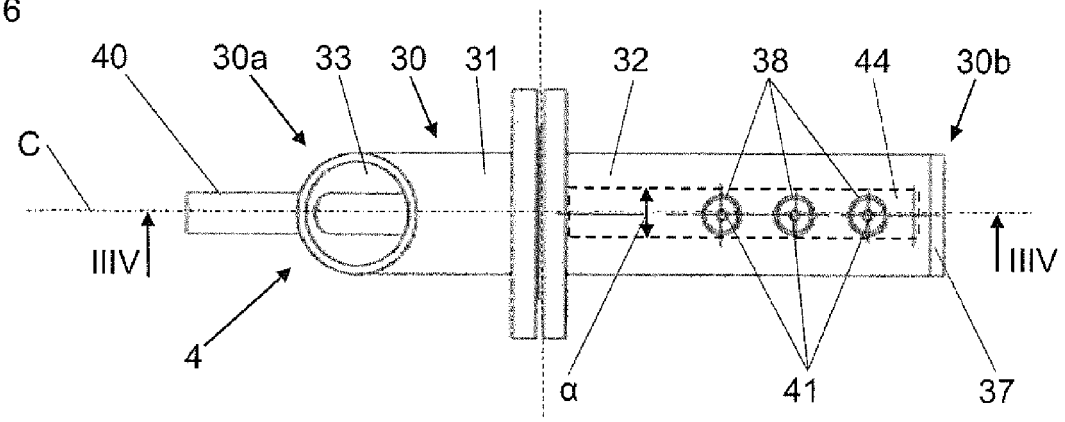


Fig 7

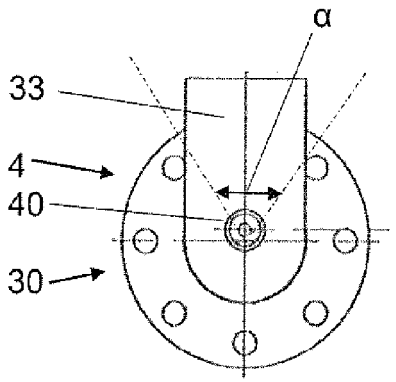
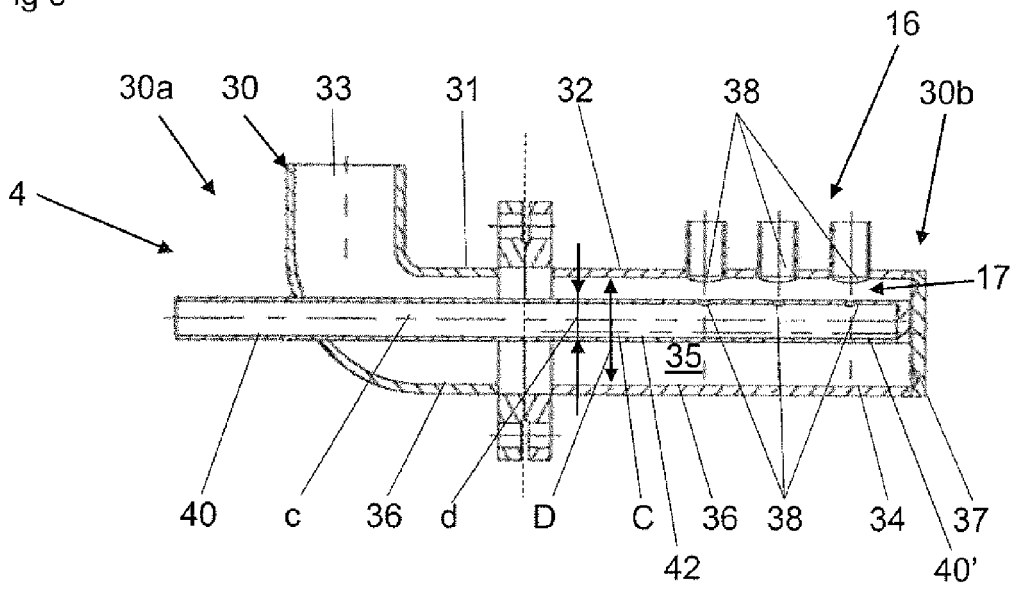


Fig 8



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Application Number
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F28D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	12 November 2015	Coquau, Stéphane

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