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Remarks:

Claims 16 - 27 are deemed to be abandoned due to non-payment of the claims fees (Rule 45(3) EPC).

(54) **A boiler assembly comprising a removable boiler unit**

(57) A boiler assembly 1 comprises a removable boiler unit 2 detachably connected to a manifold unit 4. The manifold unit 4 provides the boiler unit 2, in use, with a connection interface to a pipework system. The manifold unit 4 comprises a rear section comprising at least one guide rail 37 so positioned on the manifold unit 4 that, during assembly, the boiler unit 2 is moved along the guide rail 37 which supports and guides the boiler unit 2 on to the manifold unit 4. When assembled, the guide rail 37 supports the weight of the boiler unit 2. A rear portion of the boiler unit 2 comprises a rearwardly directed exhaust gas flue duct 25, and the rear section of the manifold unit 4 is provided with a flue box 35, a front portion of the flue box 35 being provided with a forwardly directed exhaust gas flue inlet 41 and a top portion of the flue box 35 is provided with an upwardly directed exhaust gas flue outlet 43, the assembly 1 is arranged such that as the boiler unit 2 is moved along the guide rail 37, the boiler unit 2 exhaust gas flue duct 25 sealingly connects with the manifold unit 4 exhaust gas flue inlet 41, the exhaust gas flue outlet 43 being arranged to be connected to a flue connection in the building.

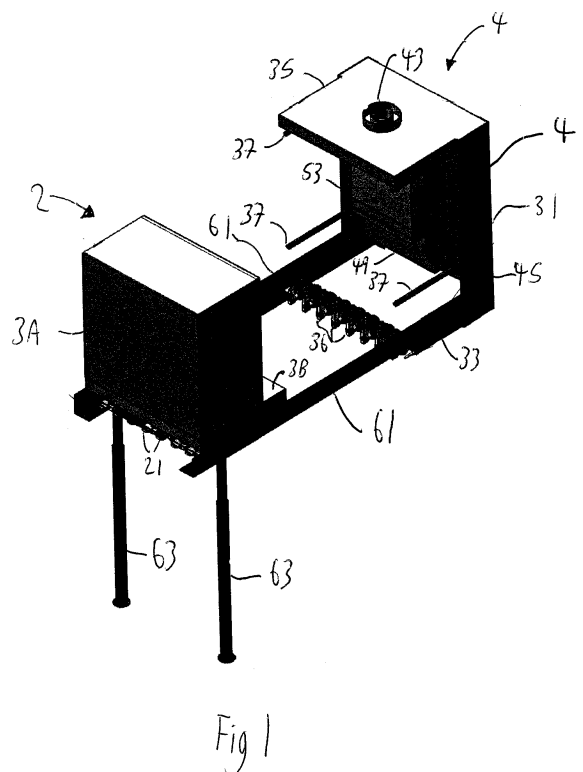


Fig 1

Description

[0001] The present invention relates to a boiler assembly comprising a removable boiler unit and particularly, although not exclusively, to a domestic boiler assembly and a method for servicing and maintaining a removable boiler unit.

[0002] Domestic boilers are well known, that when broken down or requiring servicing, have to be worked on in-situ. This requires the maintenance person to carry a large selection of spare parts. If the repair is a complex one, the household may be without hot water and/or heating for a considerable period of time.

[0003] We have provided a solution to this problem in the boiler assembly comprising a removable boiler unit of our granted UK patent GB 2378747B and European patent application EP 02254899.4. That boiler assembly comprises a removable boiler unit detachably connected to a manifold unit, with a connection interface to a pipework system. The manifold unit comprises a rear section and a base section, at least one guide rail being so positioned on the manifold rear section such that, during assembly, the boiler unit is moved along the guide rail which supports and guides the boiler unit on to the manifold unit. When assembled, the guide rail spaces the boiler unit above the manifold base section and supports the weight of the boiler unit.

[0004] Thus the boiler unit can be removed from the manifold unit for servicing or repairs and then either refitted, or replaced with another boiler unit.

[0005] The present invention stems from some work in improving our above boiler assembly.

[0006] According to a first aspect of the present invention there is provided a boiler assembly comprising a removable boiler unit detachably connected to a manifold unit, the arrangement being such that the manifold unit provides the boiler unit, in use, with a connection interface to a pipework system, the manifold unit comprising a rear section comprising at least one guide rail so positioned on the manifold unit that, during assembly, the boiler unit is moved along the guide rail which supports and guides the boiler unit on to the manifold unit, and such that, when assembled, the guide rail supports the weight of the boiler unit, **characterised in that** a rear portion of the boiler unit comprises a rearwardly directed exhaust gas flue duct, and the rear section of the manifold unit is provided with a flue box, a front portion of the flue box being provided with a forwardly directed exhaust gas flue inlet and a top portion of the flue box is provided with an upwardly directed exhaust gas flue outlet, the assembly being such that as the boiler unit is moved along the guide rail, the boiler unit exhaust gas flue duct sealingly connects with the manifold unit exhaust gas flue inlet, the exhaust gas flue outlet being arranged to be connected to a flue connection in the building.

[0007] Preferably the exhaust gas flue outlet comprises a quick release connection for connecting the flue outlet to a standard horizontal or vertical flue kit. A standard

flue kit typically comprises twin flue pipes arranged concentrically, the inner pipe being for combustion gases to be expelled outside the boiler, and the other pipe being for inlet combustion air for the boiler, the twin flue pipe is fitted with a flue terminal and optionally a flue bend that fits to the top of the flue box to enable the flue to be run in a horizontal manner. Further bends/extensions can be fitted as required for simple routing of the flue.

[0008] The flue may alternatively be routed in an upwards direction if required.

[0009] According to a second aspect of the present invention there is provided a boiler assembly comprising a removable boiler unit detachably connected to a manifold unit, the arrangement being such that the manifold unit provides the boiler unit, in use, with a connection interface to a pipework system, the manifold unit comprising a rear section comprising at least one guide rail so positioned on the manifold unit that, during assembly, the boiler unit is moved along the guide rail which support and guides the boiler unit on to the manifold unit, and such that, when assembled, the guide rail supports the weight of the boiler unit, **characterised in that** the boiler assembly is provided with a micro combined heat and power unit operative to generate electricity from the heat generated in use of the boiler assembly.

[0010] Preferably the micro combined heat and power unit is mounted on the manifold unit.

[0011] Preferably the manifold unit and the boiler unit each comprise a micro combined heat and power unit connector that mate together when the boiler unit is mounted on the manifold unit.

[0012] According to a third aspect of the present invention there is provided a boiler assembly comprising a removable boiler unit detachably connected to a manifold unit, the arrangement being such that the manifold unit provides the boiler unit, in use, with a connection interface to a pipework system, the manifold unit comprising a rear section comprising at least one guide rail so positioned on the manifold unit that, during assembly, the boiler unit is moved along the guide rail which support and guides the boiler unit on to the manifold unit, and such that, when assembled, the guide rail supports the weight of the boiler unit, **characterised in that** a renewable energy heat pump condenser is provided on the manifold unit, the heat pump condenser comprising fluid connections operative to connect the condenser to a source of heated fluid from a renewable energy source, and further comprising fluid connections operative to connect the condenser to the boiler unit such that, in use, the heated fluid from the renewable energy source passes to the boiler unit.

[0013] Preferably the condenser comprises a connection interface comprising the fluid connections necessary to connect the condenser to the source of heated fluid from the renewable energy source, the connection interface being positioned on the manifold unit below the mounting position of the boiler unit.

[0014] The renewable energy source may, for exam-

ple, be a ground source heat pump and/or a solar water heater.

[0015] According to a fourth aspect of the present invention there is provided a boiler assembly comprising a removable boiler unit detachably connected to a manifold unit, the arrangement being such that the manifold unit provides the boiler unit, in use, with a connection interface to a pipework system, the manifold unit comprising a rear section comprising at least one guide rail so positioned on the manifold unit that, during assembly, the boiler unit is moved along the guide rail which supports and guides the boiler unit on to the manifold unit, and such that, when assembled, the guide rail supports the weight of the boiler unit, **characterised in that** the manifold unit is provided with fluid connections operative to connect the manifold unit to a source of fluid from a renewable energy source, the manifold unit being further provided with routing pipework operative to route the fluid to the boiler unit such that, in use, the boiler unit is provided with water pre-heated by the fluid from the renewable energy source, the boiler assembly further comprising a boiler controller operative to control the boiler unit in dependence upon the temperature of the pre-heated water.

[0016] According to a fifth aspect of the present invention there is provided a boiler assembly comprising a removable boiler unit detachably connected to a manifold unit, the arrangement being such that the manifold unit provides the boiler unit, in use, with a connection interface to a pipework system, the manifold unit comprising a rear section comprising at least one guide rail so positioned on the manifold unit that, during assembly, the boiler unit is moved along the guide rail which support and guides the boiler unit on to the manifold unit, and such that, when assembled, the guide rail supports the weight of the boiler unit, **characterised in that** at least one of the boiler unit and manifold unit is provided with an electrical socket, the other of the boiler unit and manifold unit being provided with an electrical plug, the plug being received in the socket as the boiler unit is moved along the guide rail, the spacing between the plug and socket being such that the electrical connection between the plug and socket is only made when the boiler unit is in its final position on the manifold unit.

[0017] Thus, the electrical connection is only made once the flue connection is sealingly made between the boiler unit and the manifold unit and/or once the fluid connections are sealingly made between the boiler unit and the manifold unit.

[0018] Preferably a plurality of guide rails are provided.

[0019] Preferably the guide rails are tapered so as to be of variable transverse cross section along their length, the cross section being greater adjacent the manifold unit.

[0020] Preferably one or more of the guide rails project further from the manifold unit than one or more of the other guide rails.

[0021] Preferably the flue box of the manifold unit com-

prises an inlet air chamber and an outlet exhaust chamber, a heat exchanger being provided between the two chambers to transfer heat from the relatively hot exhaust gas to the cooler inlet air.

5 [0022] Preferably the heat exchanger comprises a plurality of flue heat rods that extend between the two chambers.

[0023] Preferably the flue box comprises a condensate collector operative to collect condensate from the flue gas.

10 [0024] Preferably the boiler assembly comprises an expansion vessel, removably mounted on the manifold unit.

[0025] Preferably the boiler assembly comprises a hot water heat exchanger, removably mounted on the manifold unit.

[0026] Preferably a drip tray is provided beneath the connection interface of the boiler assembly.

20 [0027] Preferably the boiler unit comprises a substantially 'L' shaped box when viewed from the side.

[0028] Preferably the boiler unit comprises two boxes removably mounted together such that one of the boxes can be removed to access the components in the other box.

25 [0029] According to a sixth aspect of the present invention there is provided a boiler assembly comprising a removable boiler unit detachably connected to a manifold unit, the arrangement being such that the manifold unit provides the boiler unit, in use, with a connection interface to a pipework system, the manifold unit comprising a rear section comprising at least one guide rail so positioned on the manifold unit that, during assembly, the boiler unit is moved along the guide rail which support and guides the boiler unit on to the manifold unit, and such that, when assembled, the guide rail supports the weight of the boiler unit, the boiler assembly comprising a support track for supporting the boiler unit during removal and re-assembly from and to the manifold unit, a first end of the support track being removably attached to the manifold unit, **characterised in that** a support leg is provided distal from the first end of the support track, the support leg extending generally downwardly from the support track in use so as to extend between the support track and the ground during assembly of the boiler unit onto the manifold unit so as to support the support track at a position distal from the first end.

[0030] The boiler assembly preferably comprises a plurality of support tracks for supporting the boiler unit during removal and re-assembly.

50 [0031] Preferably the boiler assembly comprises two support tracks, the arrangement being such that during use thereof each support track is disposed at respective lower corners of the boiler unit.

[0032] Preferably the or each support track is provided with bearing means operative to facilitate the movement of the boiler unit along the or each support track.

[0033] Preferably the bearing means comprise a plurality of ball bearings mounted on the or each support

track.

[0034] According to a seventh aspect of the present invention there is provided a heating system **characterised in that** the system comprises a boiler assembly according to any one of the first to sixth aspects of the present invention.

[0035] According to an eighth aspect of the present invention there is provided a method of servicing or repairing a boiler unit of a boiler assembly according to any one of the first to sixth aspects of the present invention, characterised by the method comprising detaching and removing a first boiler unit from a manifold unit; then replacing the first boiler unit with a second boiler unit and connecting the second boiler unit to the manifold unit.

[0036] Other aspects of the present invention may include any combination of the features or limitations referred to herein.

[0037] The present invention may be carried into practice in various ways, but embodiments will now be described by way of example only with reference to the accompanying drawings in which:

Figure 1 is a perspective view of a boiler assembly in accordance with the present invention in a partially assembled condition;

Figure 2 is a perspective view of a boiler unit of the boiler assembly of Figure 1;

Figure 3 is a perspective view of a manifold unit of a boiler assembly in accordance with the present invention; and

Figure 4 is a perspective view of the boiler unit of the boiler assembly of Figure 1 from the rear.

[0038] Referring to the Figures, a boiler assembly 1 comprises a removable domestic boiler unit 2 detachably connected to a manifold unit 4, the arrangement being such that the manifold unit 4 provides the boiler unit 2 with a connection interface to a heating pipework system (not shown).

[0039] The boiler unit 2 may be quickly and simply removed from the manifold unit 4 and taken away to be serviced or repaired. In order that the heating system may be used while the servicing is being carried out a replacement boiler unit may be connected to the manifold unit 4.

[0040] The boiler unit 2 comprises upper and lower boiler boxes 3A, 3B, the upper box 3A comprising a removable front panel 8; two removable side panels 10, 12; a removable top panel 14; a base panel and a back panel 18.

[0041] The boiler unit 2 contains some of the standard elements normally found in a domestic boiler including a burner unit, a combustion chamber, a fluid pump, a pressure switch for a fan, a gas valve, a diverter valve for the heat exchanger, a water pressure switch and a PCB con-

trol box.

[0042] The boiler unit 2 also comprises series of pipe connections 21. The pipe connections 21 are used as water inlet and water outlet ports for the boiler unit 2. One or more of the pipe connections 21 may be used as a gas feed port for the burner. Attached to each connection 21 there is an isolation valve 23.

[0043] The two boiler boxes 3A, 3B of the boiler unit 2 are removably connected together in an 'L' shaped configuration. This allows as much as possible of the space within the boxes 3A, 3B to be used.

[0044] The rear panel of the upper box 3A is provided with a rearwardly directed exhaust gas flue duct and push fit connection 25, a push fit electrical power supply plug 27, and push fit power connections 29 for the boiler condenser and a micro combined heat and power unit (CHP unit) 51.

[0045] The upper box 3A further comprises an internal sealed, twin lined air chamber provided with ductwork that diverts inlet combustion air to the lower box 3B to help cool the components in the upper box 3A.

[0046] The upper and lower boxes 3A, 3B are arranged such that the upper box 3A can be removed from the lower box 3B to enable access to the components located in the lower box 3B. The pipe unions and electric are arranged to be separated such that the upper and lower boxes 3A, 3B can be separated.

[0047] The manifold unit 4 is a substantially C-shaped structure comprising a rectangular rear mounting bracket 31, an oblong base frame 33 and an upper flue box 35.

[0048] The manifold unit 4 comprises four guide rails 37 extending in a direction substantially parallel to the base frame 33. In the assembled state of the boiler assembly 1, the guide rails 37 are received by channels in the boiler unit 2 and support the boiler unit 2 as it is moved towards the manifold unit 4.

[0049] The guide rails 37 are tapered so that the projecting end of each rail 37 is of smaller cross section than the remaining part of the rail 37.

[0050] Additionally, at least some of the rails 37 are of different lengths to the other rails 37 to facilitate initial mounting of the boiler unit 2 on the manifold unit 4. In this example, the upper rails 37 are longer than the lower rails 37, and the rails on the left are longer than the rails on the right. This enables one upper rail 37 to be received in one upper channel on the boiler box 2 first, followed by the second upper rail 37 in the second upper channel. As the boiler unit 2 moves along the upper rails 37, it adjusts its position and subsequently locates the lower rails 37 in the lower channels.

[0051] The base frame 33 comprises a series of pipelines 36 the respective distal ends of which are held by a front horizontal bar 37 of the frame 33. Connected to the respective distal ends of the pipelines 36 are respective isolation valves 39. In the assembled state the isolation valves 39 of the manifold unit 4 are connected to the isolation valves 23 of the boiler unit 2. A drip tray (not shown) is provided underneath the isolation valves 39.

[0052] The mounting bracket 31 of the manifold unit 4 comprises a wall bracket provided with suitable fixings to enable the manifold unit 4 to be mounted on a wall.

[0053] The front face of the flue box 35 of the manifold unit 4 further comprises a forwardly directed push fit flue inlet 41 adapted to form a push fit flue connection with the flue duct 25 of the boiler unit 2 as it is slid onto the manifold unit 4. Thus one or both of duct 25 and inlet 41 are provided with suitable gas seal(s) operative to form a gas tight flue connection when the boiler unit 2 is fully mounted on the manifold unit 4.

[0054] The flue inlet 41 is connected to an upwardly directed flue outlet 43 which extends through the horizontal top panel of the flue box 35 via suitable internal flue ductwork. The flue outlet 43 comprises a standard domestic boiler flue outlet provided with quick fit connections so as to be connected to a standard horizontal or vertical flue kit as is used with standard boiler units.

[0055] The flue box 35 is provided with an inlet air chamber and an exhaust flue chamber. These chambers incorporate a heat exchanger in the form of flue heat rods that transfer heat in use from the hot exhaust flue gas in one chamber to the cooler inlet combustion air in the other chamber to pre-heat the inlet combustion air. The flue box 35 further comprises inlet air ductwork that routes the pre-heated inlet combustion air through the flue box 35 to the boiler unit 2.

[0056] The interior of the flue box 35 is also shaped so as to allow condensate formed and/or trapped within the flue box 35 to drain from the flue box 35 to a drain provided on the manifold unit 4.

[0057] Various components of the boiler assembly 1 are mounted on the mounting bracket 31. These components include the four guide rails 37, an expansion vessel 45 which is removable from the mounting bracket 31, an electrical power supply socket 47, and a domestic hot water heat exchanger 49. These components may be hidden in use via a flush fitting front cover that fixes to the mounting bracket 31.

[0058] The power supply socket 47 is adapted to receive the push fit electrical power supply plug 27 of the boiler unit 1 when the boiler unit 1 is in its final position on the manifold unit 4. The socket 47 and plug 27 are offset, when viewed from the side, relative to the flue connections so as to be arranged such that the plug 27 is only fully received in, and in electrical contact with, the socket 47 after the flue connections are fully made, that is, after a gas tight seal has been formed by the flue connections. Thus electrical power to the boiler unit 2 is only provided after the flue connections are gas tight, and after the water connections are water tight.

[0059] The mounting bracket 31 also comprises a micro combined heat and power unit (CHP) 51. The CHP unit 51 may comprise a Stirling engine as is well known, that uses the heat generated by the boiler unit 2 in use to reciprocate a piston which drives a generator to generate electricity.

[0060] The mounting bracket 31 further comprises a

renewable energy condenser 53 connected to the flue box 33 and also connected to a condenser interface 55. The condenser interface 55 comprises connections that enable the interface 55 to be connected to pipework from a renewable energy powered water pre-heating device such as a water heating solar panel or a ground source heat pump. The interface 55 further comprises connections to the boiler unit 2 that are made when the boiler unit 2 is mounted on the manifold unit 4.

[0061] In use, the condenser 53 recovers heat from the pre-heated fluid and transfers this heat to the return water from the central heating system or hot water storage cylinder to which the boiler assembly 1 is connected in use. This therefore provides pre-heated water to the boiler unit 2 heat exchanger which is then distributed to the appropriate area of demand - ie the hot water system via the combination side/cylinder of the boiler unit 2, or to the central heating system.

[0062] The condenser 53 also recovers heat from the expelling flue gasses and transfers this heat into the return water.

[0063] It will be appreciated that the removable front cover of the mounting bracket 31 enables maintenance access to the condenser 53, heat exchangers, CHP unit 51, DHW exchanger 49 and expansion vessel 45.

[0064] In this example, a pair of 'L' shaped cross section support tracks 61 are provided one end of each track 61 being removably mounted on the manifold base frame 33 and the other end of each track 61 projecting horizontally away from the manifold unit 4. These support tracks 61 provide a guide and support for the boiler unit 2 as it is being moved towards and mounted on the guide rails 37 of the manifold unit 4. The projecting end of each track 61 is provided with adjustable length support legs 63 that extend generally vertically between the track 61 and the ground. The tracks 61 and legs 63 thus form a removable rigid mounting frame to facilitate mounting of the boiler unit 2 on the manifold unit 4.

[0065] The boiler assembly 1 comprises an electronic controller that controls the flow of water through the boiler assembly 1, and the temperature of the water provided by the boiler assembly 1 to the hot water supply and to the central heating system as required. The controller is adapted to account for the pre-heating of the supply water from the renewable energy source(s) and to control the heating of the water accordingly. The boiler assembly 1 may comprise a temperature sensor(s) operative to generate a signal indicative of the temperature of the pre-heated water from the renewable energy source.

[0066] The power connection provided by the plug 27 and socket 47 may include controller connections and data connections as required to and from the CHP unit 51 and the renewable energy condenser 53.

[0067] The boiler unit 2 may comprise a device to measure pressure within one or more of the elements of the boiler assembly 1, a device for analysing moisture within the boiler unit 2 and a device for measuring the various gases within the boiler assembly 1. The informa-

tion from these various devices can be relayed to a remote computer management system via a modem. The computer management system monitors the information received from the devices. Any faults or potential faults are logged and such information may be used by a service technician.

[0068] In an alternative embodiment (not shown in the Figures) a boiler unit comprises a removable boiler unit that is detachably connected to a pipework system via a connection interface comprising quick release connections. The pipework system comprises isolation valves adjacent to the connections of the pipework system. The boiler unit may also comprise isolation valves adjacent to the connections.

[0069] The isolation valves are used to prevent the flow of a fluid through the connections and they may be used to stop the flow of a fluid through the connections prior to the removal of the boiler unit from the pipework system. The connection interface may comprise an electrical power

[0070] Once the boiler unit has been disconnected and removed from the pipework system a replacement boiler unit may be connected to the pipework system so that the heating system may be used while the original boiler unit is being serviced off-site.

Claims

1. A boiler assembly comprising a removable boiler unit detachably connected to a manifold unit, the arrangement being such that the manifold unit provides the boiler unit, in use, with a connection interface to a pipework system, the manifold unit comprising a rear section comprising at least one guide rail so positioned on the manifold unit that, during assembly, the boiler unit is moved along the guide rail which supports and guides the boiler unit on to the manifold unit, and such that, when assembled, the guide rail supports the weight of the boiler unit, **characterised in that** a rear portion of the boiler unit comprises a rearwardly directed exhaust gas flue duct, and the rear section of the manifold unit is provided with a flue box, a front portion of the flue box being provided with a forwardly directed exhaust gas flue inlet and a top portion of the flue box is provided with an upwardly directed exhaust gas flue outlet, the assembly being such that as the boiler unit is moved along the guide rail, the boiler unit exhaust gas flue duct sealingly connects with the manifold unit exhaust gas flue inlet, the exhaust gas flue outlet being arranged to be connected to a flue connection in the building.
2. The boiler assembly of claim 1 wherein the exhaust gas flue outlet comprises a quick release connection for connecting the flue outlet to a standard horizontal or vertical flue kit.
3. The boiler assembly of claim 1 or claim 2 wherein a plurality of guide rails are provided.
4. The boiler assembly of claim 3 wherein the guide rails are tapered so as to be of variable transverse cross section along their length, the cross section being greater adjacent the manifold unit.
5. The boiler assembly of claim 3 or claim 4 wherein one or more of the guide rails project further from the manifold unit than one or more of the other guide rails.
6. The boiler assembly of any one of the preceding claims wherein the flue box of the manifold unit comprises an inlet air chamber and an outlet exhaust chamber, a heat exchanger being provided between the two chambers to transfer heat from the relatively hot exhaust gas to the cooler inlet air.
7. The boiler assembly of claim 6 wherein the heat exchanger comprises a plurality of flue heat rods that extend between the two chambers.
8. The boiler assembly of any one of the preceding claims wherein the flue box comprises a condensate collector operative to collect condensate from the flue gas.
9. The boiler assembly of any one of the preceding claims wherein the boiler assembly comprises an expansion vessel removably mounted on the manifold unit.
10. The boiler assembly of any one of the preceding claims wherein the boiler assembly comprises a hot water heat exchanger removably mounted on the manifold unit.
11. The boiler assembly of any one of the preceding claims wherein a drip tray is provided beneath the connection interface of the boiler assembly.
12. The boiler assembly of any one of the preceding claims wherein the boiler unit comprises a substantially 'L' shaped box when viewed from the side.
13. The boiler assembly of any one of the preceding claims wherein the boiler unit comprises two boxes removably mounted together such that one of the boxes can be removed to access the components in the other box.
14. A boiler assembly comprising a removable boiler unit detachably connected to a manifold unit, the arrangement being such that the manifold unit provides the boiler unit, in use, with a connection interface to a pipework system, the manifold unit comprising a

rear section comprising at least one guide rail so positioned on the manifold unit that, during assembly, the boiler unit is moved along the guide rail which support and guides the boiler unit on to the manifold unit, and such that, when assembled, the guide rail supports the weight of the boiler unit, **characterised in that** the boiler assembly is provided with a micro combined heat and power unit operative to generate electricity from the heat generated in use of the boiler assembly.

15. The boiler assembly of claim 14 wherein the micro combined heat and power unit is mounted on the manifold unit.

16. The boiler assembly of claim 15 wherein the manifold unit and the boiler unit each comprise a micro combined heat and power unit connector that mate together when the boiler unit is mounted on the manifold unit.

17. A boiler assembly comprising a removable boiler unit detachably connected to a manifold unit, the arrangement being such that the manifold unit provides the boiler unit, in use, with a connection interface to a pipework system, the manifold unit comprising a rear section comprising at least one guide rail so positioned on the manifold unit that, during assembly, the boiler unit is moved along the guide rail which support and guides the boiler unit on to the manifold unit, and such that, when assembled, the guide rail supports the weight of the boiler unit, **characterised in that** a renewable energy heat pump condenser is provided on the manifold unit, the heat pump condenser comprising fluid connections operative to connect the condenser to a source of heated fluid from a renewable energy source, and further comprising fluid connections operative to connect the condenser to the boiler unit such that, in use, the heated fluid from the renewable energy source passes to the boiler unit.

18. The boiler assembly of claim 17 wherein the condenser comprises a connection interface comprising the fluid connections necessary to connect the condenser to the source of heated fluid from the renewable energy source, the connection interface being positioned on the manifold unit below the mounting position of the boiler unit.

19. A boiler assembly comprising a removable boiler unit detachably connected to a manifold unit, the arrangement being such that the manifold unit provides the boiler unit, in use, with a connection interface to a pipework system, the manifold unit comprising a rear section comprising at least one guide rail so positioned on the manifold unit that, during assembly, the boiler unit is moved along the guide rail which

supports and guides the boiler unit on to the manifold unit, and such that, when assembled, the guide rail supports the weight of the boiler unit, **characterised in that** the manifold unit is provided with fluid connections operative to connect the manifold unit to a source of fluid from a renewable energy source, the manifold unit being further provided with routing pipework operative to route the fluid to the boiler unit such that, in use, the boiler unit is provided with water pre-heated by the fluid from the renewable energy source, the boiler assembly further comprising a boiler controller operative to control the boiler unit in dependence upon the temperature of the pre-heated water.

20. A boiler assembly comprising a removable boiler unit detachably connected to a manifold unit, the arrangement being such that the manifold unit provides the boiler unit, in use, with a connection interface to a pipework system, the manifold unit comprising a rear section comprising at least one guide rail so positioned on the manifold unit that, during assembly, the boiler unit is moved along the guide rail which support and guides the boiler unit on to the manifold unit, and such that, when assembled, the guide rail supports the weight of the boiler unit, **characterised in that** at least one of the boiler unit and manifold unit is provided with an electrical socket, the other of the boiler unit and manifold unit being provided with an electrical plug, the plug being received in the socket as the boiler unit is moved along the guide rail, the spacing between the plug and socket being such that the electrical connection between the plug and socket is only made when the boiler unit is in its final position on the manifold unit.

21. A boiler assembly comprising a removable boiler unit detachably connected to a manifold unit, the arrangement being such that the manifold unit provides the boiler unit, in use, with a connection interface to a pipework system, the manifold unit comprising a rear section comprising at least one guide rail so positioned on the manifold unit that, during assembly, the boiler unit is moved along the guide rail which support and guides the boiler unit on to the manifold unit, and such that, when assembled, the guide rail supports the weight of the boiler unit, the boiler assembly comprising a support track for supporting the boiler unit during removal and re-assembly from and to the manifold unit, a first end of the support track being removably attached to the manifold unit, **characterised in that** a support leg is provided distal from the first end of the support track, the support leg extending generally downwardly from the support track in use so as to extend between the support track and the ground during assembly of the boiler unit onto the manifold unit so as to support the support track at a position distal from the first end.

22. The boiler assembly of claim 21 further comprising a plurality of support tracks for supporting the boiler unit during removal and re-assembly.
23. The boiler assembly of claim 22 wherein the boiler assembly comprises two support tracks, the arrangement being such that during use thereof each support track is disposed at respective lower corners of the boiler unit. 5
24. The boiler assembly of any one of claims 21 to 23 wherein the or each support track is provided with bearing means operative to facilitate the movement of the boiler unit along the or each support track. 10
25. The boiler assembly of claim 24 the bearing means comprises a plurality of ball bearings mounted on the or each support track. 15
26. A heating system **characterised in that** the system comprises a boiler assembly according to any one of claims 1 to 25. 20
27. A method of servicing or repairing a boiler unit of a boiler assembly according to any one of claims 1 to 25, **characterised by** the method comprising detaching and removing a first boiler unit from a manifold unit; then replacing the first boiler unit with a second boiler unit and connecting the second boiler unit to the manifold unit. 25 30

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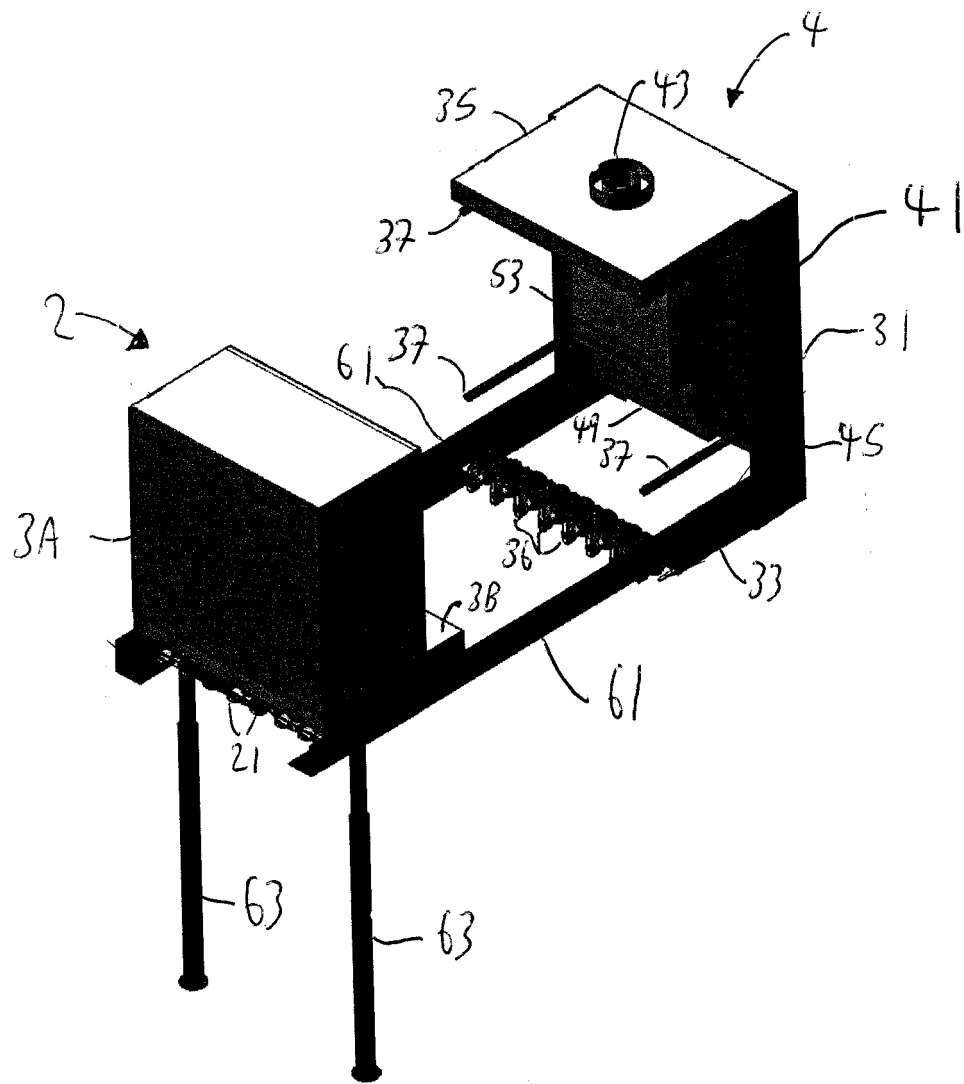


Fig 1

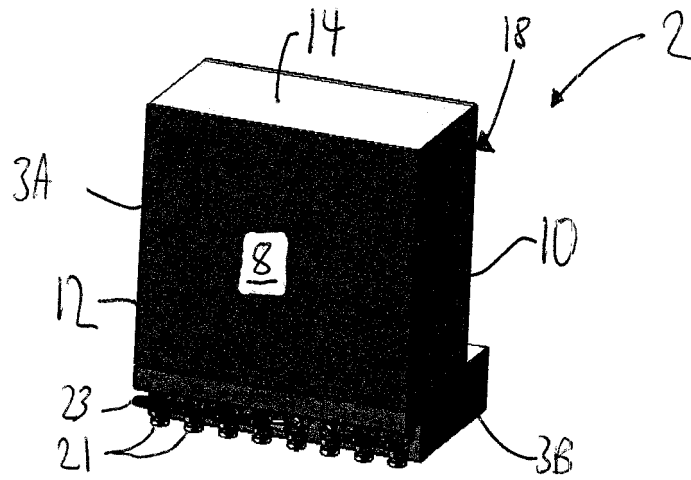


Fig 2

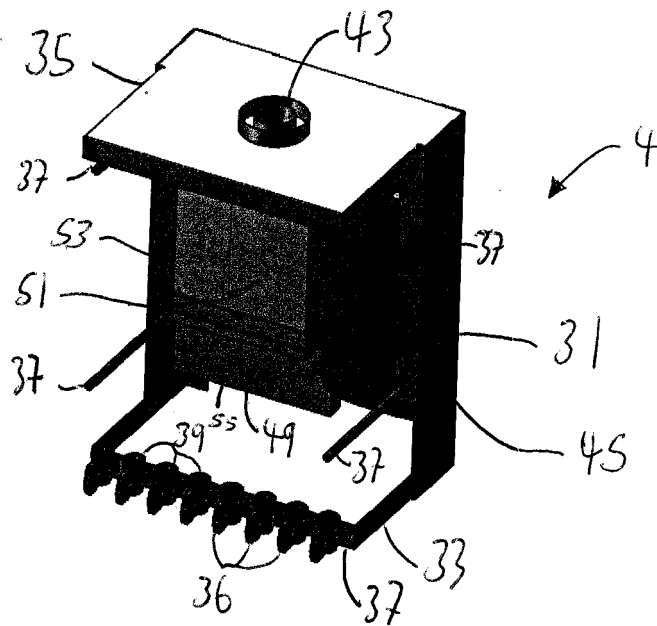
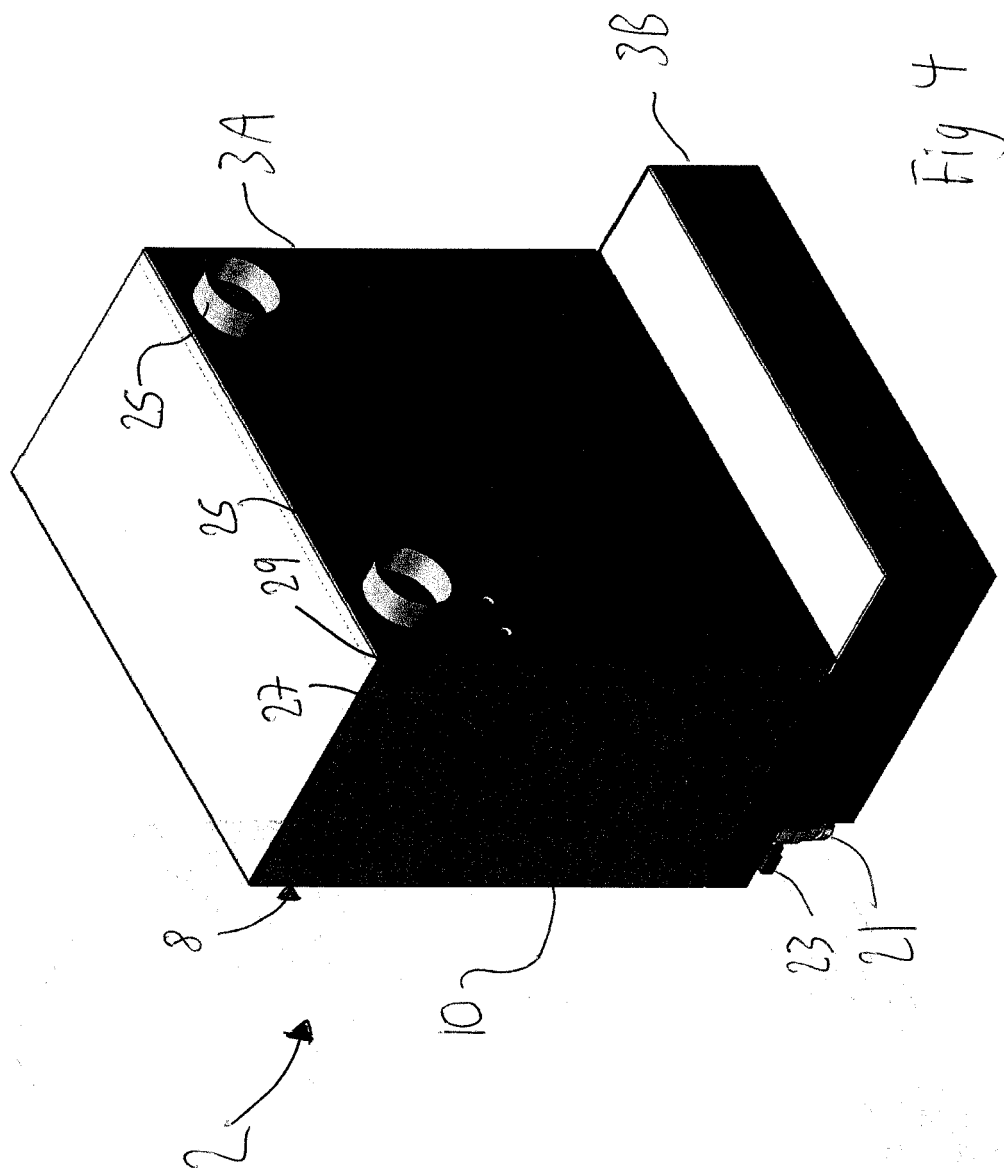


Fig 3



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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