(12) UK Patent Application (19) GB (11) 2480335 (13) A

(43) Date of A Publication 16.11.2011

(21) Application No: 1009381.3

(22) Date of Filing: 04.06.2010

(60) Parent of Application No(s)
1114572.9 under Section 15(9) of the Patents Act 1977

(71) Applicant(s):
Greenpolly Ltd
39 Furzehatt Road, Plymouth, PL9 8QX,
United Kingdom

(72) Inventor(s):
David Salmon

(74) Agent and/or Address for Service:
N.J.Akers & Co
7 Ferris Town, Truro, Cornwall, TR1 3JG,
United Kingdom

(51) INT CL:
F24H 8/00 (2006.01)

(56) Documents Cited:
EP 1762791 A **DE 029808173 U**
NL 008603088 A **US 4543892 A**

(58) Field of Search:
INT CL **F24H**
Other: **On-line databases: EPODOC, WPI**

(54) Title of the Invention: **Condensate drain assembly for a condensing boiler and boiler comprising the same**
Abstract Title: **Condensing boiler comprising a condensate drain assembly**

(57) A condensing boiler 2 is disclosed, the boiler comprising a reservoir 20 for collecting liquid condensed from flue gas produced by the boiler when in use; and a first conduit 22 extending from the reservoir and providing a first flow path for removing liquid from the reservoir in normal operation of the boiler. The boiler further comprises a second conduit 50 providing a second flow path for removing liquid from the reservoir and means, such as a valve 52, for selectively opening the second conduit to provide a flow path for removing liquid from the reservoir in the event of an excessive accumulation of liquid in the reservoir or the first conduit. The boiler can also include indication means operable to provide an indication to a user of an excessive accumulation of liquid in the reservoir or the first conduit. Preferably the indication means provides a visual and/or an audible indication. The indication means may comprise a float 32, visible through a transparent portion 44 of the first conduit, and responsive to an accumulation of condensate in the conduit. In a further aspect, a condensate drain assembly for a condensing boiler is provided.

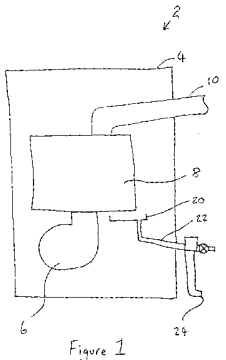

Figure 1

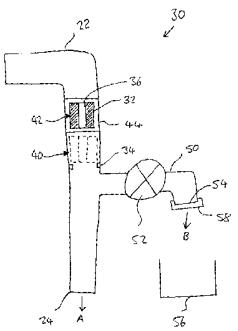

Figure 2.

GB 2480335 A

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 2007.

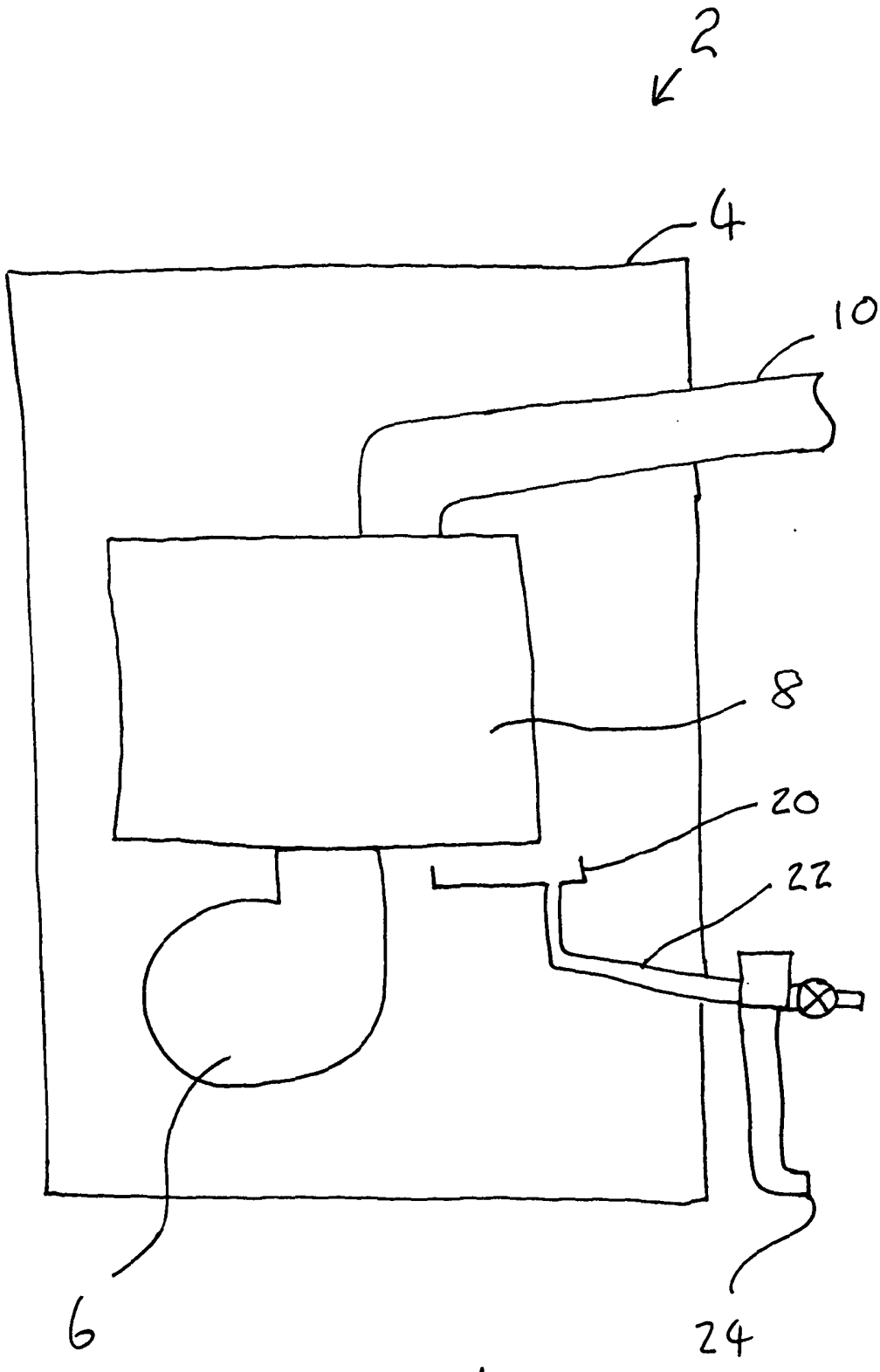

Figure 1

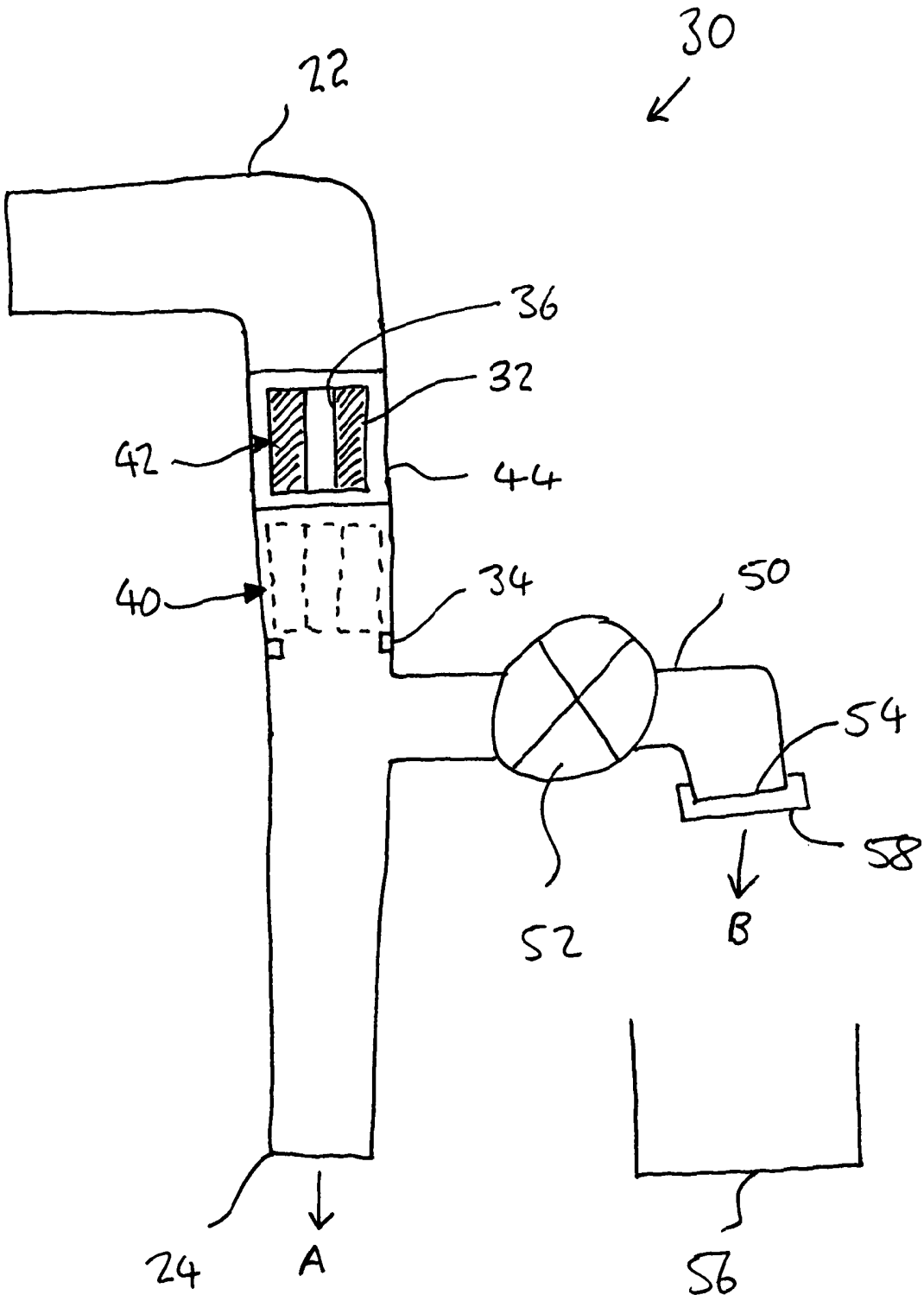

Figure 2.

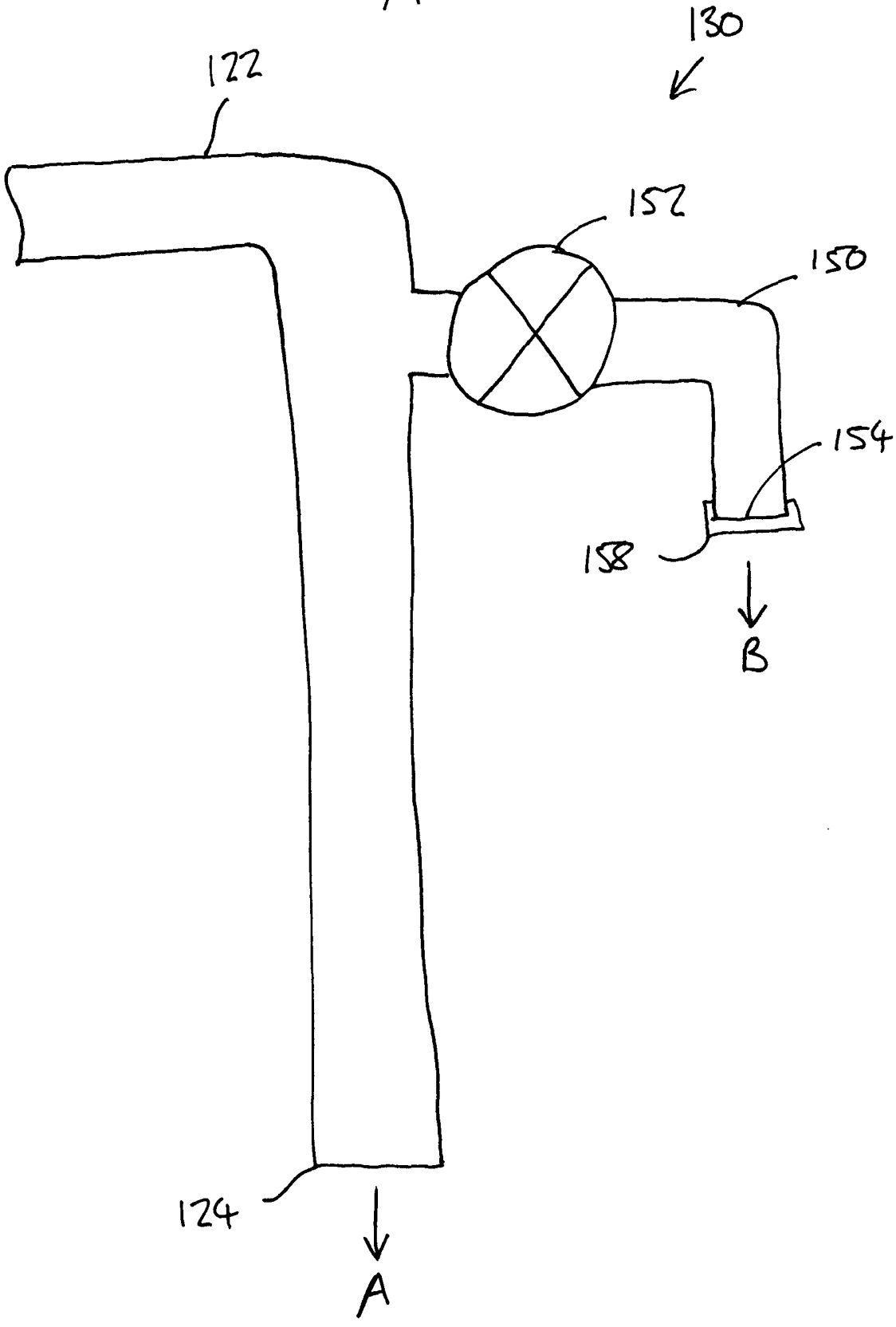

Figure 3

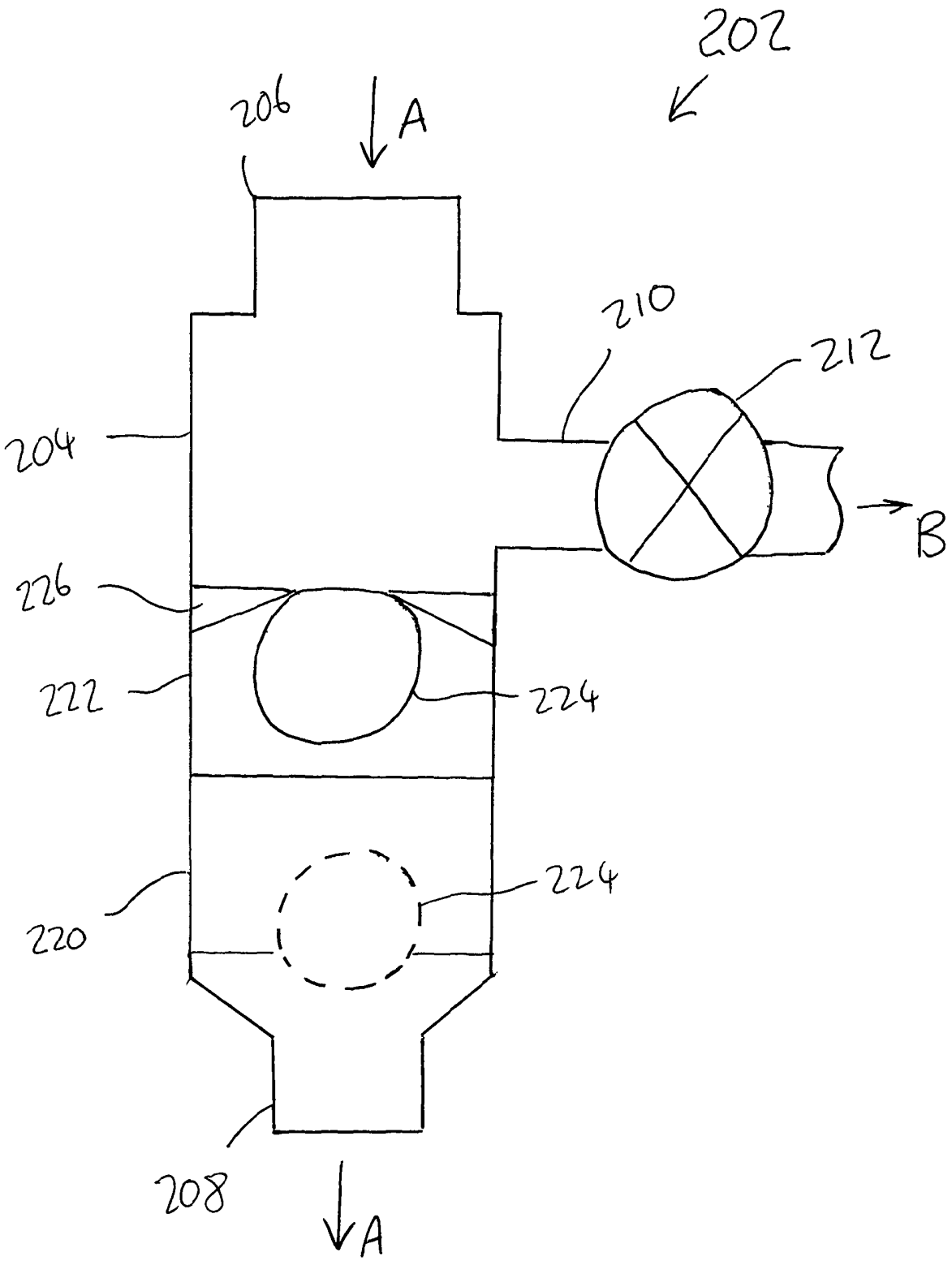

Figure 4

CONDENSATE DRAIN ASSEMBLY FOR A CONDENSING BOILER AND BOILER COMPRISING THE SAME

The present invention relates to an assembly for use in the condensate drain of a condensing boiler and to a condensing boiler comprising the same.

The combustion of a fuel, such oil or gas, in a boiler generates a flue gas. A boiler may produce flue gas at a temperature of 180°C or higher. As a result, a considerable amount of heat generated by the combustion of the fuel leaves the boiler by way of the hot flue gases and is lost. To increase the efficiency of boilers, it is well known to subject the hot flue gases to a heat exchange, to remove a portion of the heat from the flue gases before being exhausted. The result of remove heat from the flue gases in this way causes water vapour in the flue gases to condense. Such so-called 'condensing boilers' have a significantly higher efficiency than the aforementioned variety of boilers. Condensate, in the form of water, produced in the condensing boilers during normal operation is collected in the lower region of the boiler and is simply discharged to a drain.

One problem arising with condensing boilers, in particular those situated externally, is freezing of the condensate in cold weather. This can result in the condensate drain becoming blocked, with the risk that condensate will build up in the boiler. As a result, condensing boilers are generally provided with a cut-out system that shuts off the boiler when the volume of condensate in the boiler reaches or exceeds a predetermined amount.

One known design of condensing boiler comprises an assembly that allows a body of condensate to accumulate within the boiler and to only be discharged to the condensate drain when the volume of condensate reaches a predetermined amount. In this way, the relatively large volume of condensate being discharged is less likely to freeze and block the condensate drain.

A number of proposals for detecting a blockage in the condensate drain line of a condensing boiler and means for controlling the operation of the boiler have been made.

US 4,729,328 discloses a trap assembly for condensing boiler. The trap assembly is disposed in the condensate drain and comprises a float responsive to an accumulation of liquid within the condensate drain line, indicating a blockage in the line. The float is caused to rise by liquid trapped in the condensate drain line and interrupt the flow of flue gas. The change in pressure in the flow of flue gas is detected and the boiler is shut down in response thereto.

US 4,682,579 concerns an overflow control for a furnace or boiler. Again, a float is disposed in the condensate drain line and, when caused to rise due an accumulation of liquid in the line, blocks the flue gas vent. A pressure sensor detects the change in back pressure in the flue gas vent and shuts down the boiler.

GB 2,354,313 is also concerned with blockages in the condensate drain line of a condensing boiler and proposes a safety device for the condensate trap of the boiler. In particular, GB 2,354,313 discloses a trap having an inlet and an outlet for condensate. If the outlet is blocked, the condensate level rises within the trap towards the top of a vent tube and creates a positive pressure in a dip tube extending within the trap. The pressure in the dip tube is monitored using a pressure switch, which also functions to control the operation of the boiler, shutting down the boiler in the event that the condensate level in the trap rises. A similar arrangement is shown and described in GB 2,290,371.

A condensate overflow safety switch is disclosed in US 2002/0124582. The safety switch comprises a float containing an annular magnet and disposed to respond to an increase in the level of liquid in the condensate drain pan. As the float rises, the annular magnet activates a reed switch, which in turn shuts down the boiler.

A condensate trap for a condensing gas boiler is disclosed in US 2009/0229539. In particular, there is shown and described a condensate outlet

assembly having an intermediate reversely-turned trap portion, shown as a generally U-shaped tube, connected to the condensate collection system.

While a number of systems for monitoring the flow of condensate from the condensing boiler to a condensate drain and controlling the operation of the boiler in the event of an accumulation of the condensate have been proposed, a number of problems still remain.

First, while means are known for shutting down the operation of a condensing boiler in the event of an excessive accumulation of condensate liquid, there are no simple and effective means for addressing the problem and allowing the boiler to be restarted. Thus, for example, a user faced with a boiler that has been shut down due to excessive accumulation of condensate must first rectify the problem, such as a blocked condensate drain, before the boiler may be reset and restarted. In many situations, this is not immediately possible. Second, in many cases, a user is faced with a boiler that is inoperative, without any indication as to why the boiler has shutdown and ceased to function.

Accordingly, there is a need for an improved system for addressing the problems arising in a condensing boiler with an excessive accumulation of condensate liquid.

In a first aspect, the present invention provides a condensing boiler, the boiler comprising:

a reservoir for collecting liquid condensed from flue gas produced by the boiler when in use; and

a conduit extending from the reservoir and providing a first flow path for removing liquid from the reservoir in normal operation of the boiler;

wherein the boiler further comprises a second conduit providing a second flow path for removing liquid from the reservoir; and

means for selectively opening the second conduit to provide a flow path for removing liquid from the reservoir in the event of an excessive accumulation of liquid in the reservoir.

In a second aspect, the present invention provides a condensing boiler, the boiler comprising:

a reservoir for collecting liquid condensed from flue gas produced by the boiler when in use; and

a first conduit extending from the reservoir and providing a first flow path for removing liquid from the reservoir in normal operation of the boiler;

wherein the boiler further comprises indication means operable to provide an indication to a user of an excessive accumulation of liquid in the reservoir or the first conduit.

In a further aspect of the present invention, there is provided a condensing boiler, the condensing boiler comprising:

a reservoir for collecting liquid condensed from flue gas produced by the boiler when in use; and

a first conduit extending from the reservoir and providing a first flow path for removing liquid from the reservoir in normal operation of the boiler;

wherein the boiler further comprises a second conduit providing a second flow path for removing liquid from the reservoir;

means for selectively opening the second conduit to provide a flow path for removing liquid from the reservoir in the event of an excessive accumulation of liquid in the reservoir or the first conduit; and

indication means operable to provide a visible indication to a user of an excessive accumulation of liquid in the reservoir or the first conduit.

Still further, the present invention provides a condensate drain assembly for a condensing boiler the boiler having a first conduit for providing a first flow path for removing condensate from a reservoir, the assembly comprising:

a second conduit providing a second flow path for removing liquid from the reservoir;

means for selectively opening the second conduit to provide a flow path for removing liquid from the reservoir in the event of an excessive accumulation of liquid in the reservoir; and

indication means operable to provide a visible indication to a user of an excessive accumulation of liquid in the conduit.

The present invention provides a condensing boiler or an assembly for a condensing boiler, to address the problems arising in the case of an excessive accumulation of condensate in the boiler, for example as a result of a blockage in the condensate drain preventing condensate from leaving the boiler. The term 'condensing boiler' as used herein is a reference to any boiler in which, during operation, liquid condenses from the flue gas produced by combustion of the boiler fuel and is collected in a vessel or reservoir in the boiler. Such boilers are well known in the art and available commercially in a variety of different forms. Such boilers may operate with any suitable fuel, such as oil or gas, and the present invention is not limited in its application to one particular type of boiler.

The present invention is particularly suitable for use with or installation in a domestic condensing boiler.

As noted above, the present invention addresses the problem of the excessive accumulation of condensate in the boiler. In this respect, the term 'excessive accumulation' is a reference to an undesirable accumulation of condensate, for example such as to render the operation of the boiler less efficient or unsafe, potentially leading to the boiler having its operation affected or even being shut down.

In general, condensing boilers comprise a housing within which the components of the boiler are contained, such as the burner assembly, one or more heat exchangers, control systems, and the like.

In general, condensing boilers comprise a means or reservoir for collecting liquid that condense from the flue gas produced by the boiler during normal operation. Such a reservoir may be a vessel, a tray or the like, and is typically located within the housing of the boiler. The condensate generally consists essentially of water, typically with one or more impurities, produced by the combustion of the fuel within the boiler during normal operation thereof. The particular composition of the condensate liquid will vary according to such factors as

the design of the boiler, the fuel being combusted, the condition of the boiler, and the like. The present invention is not restricted in its application to a particular condensate composition and is generally applicable.

Further, in general condensing boilers comprise a means for removing condensate collected in the reservoir and leading it away from the boiler, for example to a drain. The means typically comprise a conduit, such as a pipe or line, to provide a flowpath for condensate leading from the reservoir to the drain or other point of disposal. The conduit may be located wholly within the housing of the boiler or may extend from within the housing of the boiler to the exterior of the housing. For example, the conduit may comprise a pipe or line extending from the reservoir within the boiler housing, through an aperture in the housing, and to a drain or other disposal point located nearby. In normal operation, this conduit is open and allows the free and unrestricted flow of condensate from the reservoir to the drain or other disposal point. However, the conduit may become partially or wholly blocked, causing an excessive accumulation of condensate in the reservoir. Such a blockage may be caused by a variety of factors, a particularly common cause being cold or freezing weather, causing ice to form in the conduit between the reservoir and the drain.

In one aspect, the present invention provides a second conduit providing a second, alternative flowpath for condensate to leave the reservoir. This conduit may be any suitable pipe, line or the like, to allow the condensate to flow from the reservoir to a suitable disposal point, such as a drain. The disposal point may be the same as used by the first conduit, or may be different.

The second conduit may be entirely separate and independent of the first conduit, for example extending from a different outlet of the reservoir to the first conduit. Alternatively, the second conduit may extend from the first conduit at a position remote from the reservoir. In such a case, the first and second flowpaths have a portion common. That is, condensate leaving the reservoir may flow first along a portion of the first conduit, thereafter flowing along the second conduit. In such an embodiment, the second conduit should extend from the first conduit at a position that is upstream of any likely position of blockage of the first conduit. For

example, in the case of a conduit blocked by ice formation, ice will likely form in the conduit some distance from the reservoir and/or the boiler, for example external to the housing of the boiler or sufficiently far from the burner and other components of the boiler for the temperature in the conduit to fall below freezing. The second conduit should extend from the first conduit at a position closer to the reservoir than the likely position of such a blockage by ice.

The second conduit may extend to a suitable disposal site, such as a drain or the like, which may be the same or different to that of the first conduit. Alternatively, the second conduit may be arranged to allow the condensate to be discharged into a suitable container, for disposal in another manner. In one arrangement, the second conduit terminates in an outlet, allowing the user to dispense condensate into a container, either directly or by allowing the user to temporarily connect a hose, tube or the like to the outlet.

The second conduit may be provided with a suitable closure, such as a cap or the like, at its open distal end, to prevent the ingress of foreign material or objects which may cause a partial or total blockage of the second conduit.

In the first aspect of the present invention, the boiler further comprises means for selectively opening the second conduit to provide a flow path for removing liquid from the reservoir in the event of an excessive accumulation of liquid in the reservoir. Under normal operating conditions, the second conduit is closed, with condensate leaving the reservoir along the first flowpath of the first conduit. In the event of the first conduit becoming partially or wholly blocked, so as to cause an excessive accumulation of condensate, the second conduit may be opened, to provide an alternative path for condensate to leave the boiler. This in turn allows normal operation of the boiler to be maintained.

The means for selectively opening the second conduit may be operable automatically, for example in response to a signal from a suitable sensor that determines the degree of accumulation of condensate in the reservoir. More preferably, the said means is operable manually by the user of the boiler.

The means for selectively opening the second conduit may be any suitable means, preferably a valve. Suitable automatically and manually operated valves for such use are known in the art and are commercially available.

In use, with an automatic system, an excessive accumulation of condensate is detected and the second conduit opened, to drain the accumulated condensate, thus allowing the boiler to operate normally once more. In the case of a manual system, in the event of the boiler shutting down and/or operating abnormally, the user of the boiler, having determined that the boiler has an excessive accumulation of condensate, may open the second conduit to drain the accumulated condensate, thus allowing the boiler to operate normally once more.

In the second aspect, the present invention provides indication means operable to provide an indication to a user of an excessive accumulation of liquid in the conduit. Any suitable indication means may be used. For example, the indication may be one or more of a visible indication or an audible indication. A visible indication is preferred.

The indication may be generated by any suitable means. For example, the boiler may comprise a sensor to detect the level or volume of condensate in the reservoir and provide an indication of excessive accumulation. Suitable sensor an indicator means are known in the art. A preferred arrangement comprises a float, the position of which changes according to the level of condensate in the reservoir or the first conduit, and provides a visible indication of the same to the user.

More preferably, the indication means is provided in or associated with the first conduit and provides an indication in the case of an excessive accumulation of condensate in the first conduit. In particular, the indication means is responsive to an accumulation of condensate in the conduit, which may lead to an excessive accumulation of condensate in the reservoir, if left unchecked. In this way, the indication means provides an advance warning of condensate building up in the reservoir and the boiler shutting down, thereby allowing action to be taken by the user without necessarily interrupting the normal operation of the boiler. Again, any

suitable means may be provided to detect an accumulation of condensate in the first conduit and provide an indication of the same to the user.

In one preferred embodiment, the indication means comprises a float visible to the user, for example by having the float housed and retained within a portion of the conduit that is partially or wholly transparent. The float may be arranged to provide a visual indication by moving in response to an accumulation of condensate in the first conduit. Alternatively, and more preferably, the float also acts as a non-return valve, preventing condensate from passing in the reverse direction along the first conduit, towards the reservoir in the boiler. In particular, the indication means may comprise a float moveable between a lower position, corresponding to normal operation of the boiler and condensate drain, and an upper position, corresponding to an accumulation of condensate in the first conduit. The float may be visible to a user in the upper position or both the upper and lower positions. If the float is to act as a non-return valve, the indication means further comprises a seal assembly, the float contacting the seal assembly when in the upper position, to thereby seal the first conduit and prevent water flowing in the reverse direction to normal operation.

An alternative non-return valve may be provided in the first conduit, instead of or in addition to the aforementioned float assembly.

In a particularly preferred aspect, the present invention provides a boiler having both indication means operable to provide a indication to a user of an excessive accumulation of liquid in the conduit and a second conduit providing a second flowpath for condensate to leave the reservoir, as hereinbefore described.

In this embodiment, the second conduit may extend from a position upstream of the indication means or downstream of the indication means.

As noted above, the present invention also provides a condensate drain assembly for a condensing boiler, the boiler having a first conduit for providing a first flow path for removing condensate from a reservoir. The assembly comprises a second conduit providing a second flow path for removing liquid from the reservoir and means for selectively opening the second conduit to provide a flow path for

removing liquid from the reservoir in the event of an excessive accumulation of liquid in the reservoir. The assembly further comprises indication means operable to provide a visible indication to a user of an excessive accumulation of liquid in the conduit. Such an assembly may be incorporated in a newly constructed boiler before or during installation. However, such an assembly may also be installed in an existing boiler, to improve is operability and efficiency.

The assembly may further comprise means for providing control to the boiler in response to an accumulation of condensate in the conduit, in particular to shutdown the boiler in the event of an excessive accumulation of liquid. Such means are known in the art and are commercially available.

Embodiments of the present invention will now be described, by way of example only, having reference to the accompanying drawings, in which:

Figure 1 is a diagrammatical representation of the general arrangement of a condensing boiler according to one embodiment of the present invention;

Figure 2 is a diagrammatical cross-sectional representation of an assembly according to one embodiment of the present invention for providing an indication of an accumulation of condensate and a second flowpath for condensate;

Figure 3 is a diagrammatical representation of an assembly according to a second embodiment of the present invention; and

Figure 4 is a diagrammatical representation of an assembly according to a third embodiment of the present invention.

Turning to Figure 1, there is shown a condensing boiler, generally indicated as 2, having a housing 4. The boiler 2 is of generally known construction, with the housing 4 containing the conventional components of the boiler, such as a burner assembly 6, one or more heat exchangers 8 and a flue gas outlet 10. Other

components of the boiler 2, although not shown in Figure 1 for clarity, will be readily apparent and understood by the person skilled in the art.

The boiler 2 further comprises a reservoir for collecting condensate in the form of a tray 20. A first conduit 22 leads from the tray 20 and provides a first flowpath for condensate to leave the tray 20. The first conduit 22 extends from the tray through the housing 4 externally of the boiler and terminates in an outlet 24, which may be positioned to direct condensate into a drain or other disposal location, as desired.

The first conduit 22 is provided with an assembly according to the present invention, generally indicated as 30 and shown in more detail in Figure 2. The assembly 30 is shown in Figure 1 as being located outside the housing 4. However, it is to be understood that part or all of the assembly may be located within the housing 4, as an alternative configuration.

Turning to Figure 2, the assembly 30 is located in the first conduit 22 and comprises a float 32 retained in the conduit 22 by a retaining ring 34, limiting the downwards movement of the float. The float 32 is disposed within the first conduit 22 and is shaped to present little or no obstacle to the flow of condensate in normal operation of the boiler, for example by being sufficiently smaller in diameter than the internal diameter of the conduit 22 or by having a bore 36 therethrough, as shown in Figure 2. The float 32 is movable between a lower position 40 as shown by the dotted lines and an upper position 42 as shown by the solid lines. The float is caused to rise from the lower position 40 to the upper position 42 under the action of an accumulation of condensate in the conduit 22. The float thus provides an indication of the level of condensate in the conduit, in particular being caused to rise when the level of condensate in the conduit 22 rises due to the conduit being partially or wholly blocked.

The conduit 22 is provided with a transparent portion 44, through which the position of the float may be viewed and determined by a user.

In use, in normal operation, the float 32 is held in the lower position 40, with condensate flow along the conduit 22 to the outlet 24, as indicated by arrow A. In the event of a partial or complete blockage of the conduit 22 downstream of the float 32, the condensate will accumulate in the conduit, its level rising to the position of the float, causing the float to rise to the upper position 42, indicating a blockage in the conduit 22.

As noted above, the assembly 30, in particular the float 32 and the transparent portion 44, are located in the conduit 22 at a position upstream of the likely position of any blockage. This may be outside the housing 4 or within the housing, as mentioned above. In particular, the assembly 30 is preferably located at a sufficient proximity to the boiler components, such that the heat generated by the boiler maintains the conduit 22 at and above the float 32 free from ice formation.

The assembly 30 further comprises a second conduit 50 extending from the first conduit 22 at a position adjacent and downstream of the float 32. The second conduit 50 is provided with a valve 52 for controlling the flow of condensate along the second conduit 50. The second conduit 50 may extend to a drain or the like, in the same manner as the first conduit 22. Alternatively, the second conduit may terminate in an outlet 54, as shown in Figure 2, to allow condensate to be discharged into a suitable container 56.

The second conduit 50 is provided with a removable cap 58 to close the outlet 54.

In use, during normal operation, the condensate produced by the boiler leaves in the conventional manner along the conduit 22 and is discharged therefrom through the outlet 24, as indicated by arrow A. The valve 52 is kept closed under normal operating conditions. In the event of an excessive accumulation of condensate arising, in particular being indicated by the float 32, the user may open the valve 52, to discharge the accumulated condensate through the second conduit 50 to the container 56 or other disposal, as indicated by arrow B. In this way, normal operation of the boiler may be resumed.

Turning to Figure 3, an alternative embodiment of the assembly of the present invention is shown, generally indicated as 130. The assembly shown in Figure 3 is similar to that of Figure 2, but without the indication means. Thus, the assembly 130 is located in the first conduit 122. The assembly 130 comprises a second conduit 150 extending from the first conduit 122. The second conduit 150 is provided with a valve 152 for controlling the flow of condensate along the second conduit 150. The second conduit 150 may extend to a drain or the like, in the same manner as the first conduit 122. Alternatively, the second conduit may terminate in an outlet 154, as shown in Figure 3, to allow condensate to be discharged into a suitable container.

The second conduit 150 is provided with a removable cap 158 to close the outlet 154.

In use, during normal operation, the condensate produced by the boiler leaves in the conventional manner along the conduit 122 and is discharged therefrom through the outlet 124, as indicated by arrow A. The valve 152 is kept closed under normal operating conditions. In the event of an excessive accumulation of condensate arising, the user may open the valve 152, to discharge the accumulated condensate through the second conduit 150 to the container or other disposal, as indicated by arrow B. In this way, normal operation of the boiler may be resumed.

The assemblies 30 and 130 shown in Figures 2 and 3 may be installed in a new boiler. However, the assemblies may also be used to modify an existing boiler installation and lend themselves to be easily installed in the existing condensate conduit of the boiler.

The assembly 130 is shown in Figure 3 as being located in the first conduit 122. However, the assembly may be installed in direct communication with the condensate reservoir, such as the tray 20 shown in Figure 1. In this way, the second conduit 150 provides a second, entirely independent flowpath for discharging condensate from the boiler as an alternative to the flowpath provided by the first conduit.

Turning to Figure 4, there is shown an assembly according to a further embodiment of the present invention, generally indicated as 202. The assembly 202 is arranged to be installed in the condensate drain conduit or first conduit of a condensing boiler. The assembly 202 comprises a generally cylindrical housing 204, having an inlet 206 at its upper end for receiving condensate collected in and discharged from the boiler when in use. The housing 204 has an outlet 208 at its lower end, through which condensate is discharged, for example to a drain or the like, in normal operation.

A second conduit 210 extends from one side of the housing 204 and is provided with a valve 212.

The housing 204 has a lower, opaque portion 220 and an upper transparent portion 222. A generally spherical float 224 is disposed within the housing and free to move between a lower position in the lower portion 220 (the float shown by way of a dotted line in this position) and an upper position in the upper portion 222 (the float shown by a solid line in this position). A seal 226 is disposed within the housing 204 so as to be contacted by the float 224, when the float is in the upper position as shown in Figure 4, thereby sealing the housing 204 and preventing the flow of liquid in an upwards direction.

In use, during normal operation, condensate from the boiler enters the housing 204 through the inlet 206 and leaves the housing through the outlet 208, as indicated by arrows A. The float 224 is in the lower position and not visible through the housing. The valve 212 in the second conduit is closed.

Should the first conduit taking condensate to the drain become blocked downstream of the housing, the condensate will accumulate in the housing 204. The accumulation of liquid causes the float 224 to rise to the upper position, as shown in Figure 224. When in the upper position, the float 224 contacts the seal 226 and closes the housing to the flow of liquid in the reverse direction to arrows A. The float 224 is visible in the upper transparent portion of the housing 222. Upon seeing the float in the upper position, a user can open the valve 212, allowing accumulated condensate to leave the assembly through the second conduit 210 as shown by

arrow B. The condensate may be fed to a drain or collected in a receptacle, as required. By draining the condensate in this way, normal operation of the boiler can be maintained.

CLAIMS

1. A condensing boiler, the boiler comprising:

a reservoir for collecting liquid condensed from flue gas produced by the boiler when in use; and

a conduit extending from the reservoir and providing a first flow path for removing liquid from the reservoir in normal operation of the boiler;

wherein the boiler further comprises a second conduit providing a second flow path for removing liquid from the reservoir; and

means for selectively opening the second conduit to provide a flow path for removing liquid from the reservoir in the event of an excessive accumulation of liquid in the reservoir.

2. The boiler according to claim 1, wherein the first conduit extends to a disposal point, the second conduit extending to a disposal point for the condensate different to the disposal point of the first conduit.

3. The boiler according to claim 1, wherein the second conduit is arranged to dispense condensate into a receptacle.

4. The boiler according to any preceding claim, wherein the second conduit is independent of the first conduit.

5. The boiler according to any of claims 1 to 3, wherein the first and second flowpaths have a common portion.

5. The boiler according to any preceding claim, wherein the second conduit is provided with a closure at its distal end.

6. The boiler according to any preceding claim, wherein the means for selectively opening the second conduit is operable automatically, the boiler further comprising means for detecting an accumulation of condensate in the first conduit and operating the means for selectively opening the second conduit.

7. The boiler according to any preceding claim, wherein the means for selectively opening the second conduit is manually operable.

8. A condensing boiler, the boiler comprising:

a reservoir for collecting liquid condensed from flue gas produced by the boiler when in use; and

a first conduit extending from the reservoir and providing a first flow path for removing liquid from the reservoir in normal operation of the boiler;

wherein the boiler further comprises indication means operable to provide an indication to a user of an excessive accumulation of liquid in the first conduit.

9. The boiler according to claim 8, wherein the indication means provides a visual and/or an audible indication.

10. The boiler according to either of claims 8 or 9, wherein the indication means is associated with the first conduit and provides an indication of an accumulation of condensate in the first conduit.

10. The boiler according to either of claims 8 or 9, wherein the indication means comprises a float responsive to an accumulation of condensate in the first conduit.

11. The boiler according to claim 10, wherein the float is moveable between a lower position corresponding to normal operation of the boiler and an upper position corresponding to an excessive accumulation of condensate in the first conduit.

12. The boiler according to claim 11, wherein the float is visible to a user when in the upper position.

13. The boiler according to any of claims 10 to 12, wherein the float acts as a non-return valve and contacts a seal assembly in the case of an excessive accumulation of condensate in the first conduit.

14. A condensing boiler, the condensing boiler comprising:

a reservoir for collecting liquid condensed from flue gas produced by the boiler when in use; and

a first conduit extending from the reservoir and providing a first flow path for removing liquid from the reservoir in normal operation of the boiler;

wherein the boiler further comprises a second conduit providing a second flow path for removing liquid from the reservoir;

means for selectively opening the second conduit to provide a flow path for removing liquid from the reservoir in the event of an excessive accumulation of liquid in the reservoir or the first conduit; and

indication means operable to provide a visible indication to a user of an excessive accumulation of liquid in the reservoir or the first conduit.

15. The boiler according to claim 14, wherein the indication means is associated with the first conduit.

16. The boiler according to claim 15, wherein the second conduit extends from the first conduit upstream of the indication means.

17. A condensate drain assembly for a condensing boiler the boiler having a first conduit for providing a first flow path for removing condensate from a reservoir, the assembly comprising:

a second conduit providing a second flow path for removing liquid from the reservoir;

means for selectively opening the second conduit to provide a flow path for removing liquid from the reservoir in the event of an excessive accumulation of liquid in the reservoir; and

indication means operable to provide a visible indication to a user of an excessive accumulation of liquid in the conduit.

18. A boiler substantially as hereinbefore described having reference to any of Figures 1, 2, 3 or 4.

19. A condensate drain assembly substantially as hereinbefore described having reference to any of Figures 1, 2, 3 or 4.

INTELLECTUAL PROPERTY OFFICE

Application No:	GB1009381.3	**Examiner:**	Gareth Davies
Claims searched:	1-7, 14-19	**Date of search:**	21 July 2010

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-6	EP1762791 A (VAILLANT) and WPI Abstract Accession No. 2007-441245 [43] - see abstract and figure 5; noting first conduit (1, 2, 8), second conduit (13), sensors (7) and pump (5).
A	-	DE29808173 U (VAILLANT II) and WPI Abstract Accession No. 1998-438825 [38] - see abstract and figure 1.
A	-	NL8603088 A (LINDEMAN) and WPI Abstract Accession No. 1988-089854 [13] - see abstract and figures 1 and 2; noting transparent outer pipe (17).

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC[X] :

Worldwide search of patent documents classified in the following areas of the IPC

F24H

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI

International Classification:

Subclass	Subgroup	Valid From
F24H	0008/00	01/01/2006