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(54) **Boiler unit**

(57) 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).

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 is connected to the manifold unit 4.

The boiler unit 2 comprises a plurality of removable panels 8; 10, 12; 14; 16 and 18. The front panel 8 comprises a security lock 22. A timer 28 is also provided for turning the boiler unit 2 on and off and to indicate when a service is due or to indicate a fault.

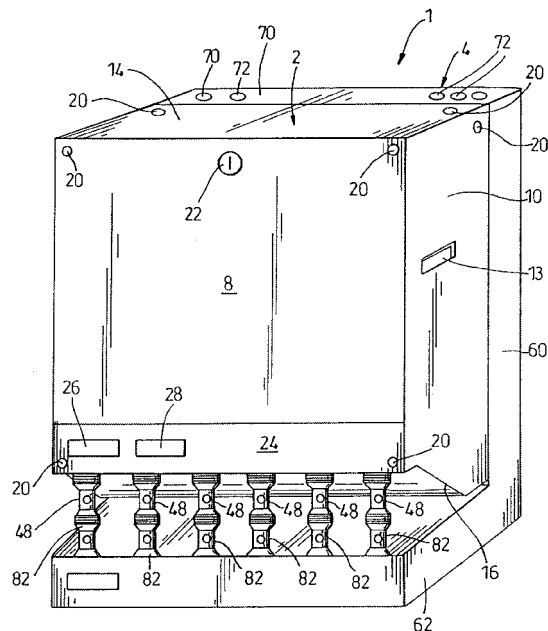


Fig. 1

Description

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

[0002] At present a domestic boiler that has broken down or requires servicing has 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 heating for a considerable period of time.

[0003] According to a first aspect of the present invention there is provided a boiler assembly characterised by a removable boiler unit detachably connected to a manifold unit, the arrangement being such that the manifold unit provides the boiler unit with a connection interface to a pipework system.

[0004] The boiler unit is preferably a self contained unit comprising the components required for the production of heat, the components being a fan motor, a fan pressure switch, a burner unit, a heat exchanger, a fluid pump, a gas valve and a PCB control box.

[0005] The boiler unit is preferably a self contained unit comprising the components required for the production of hot water, the components being a fan motor, a fan pressure switch, a burner unit, a heat exchanger, a fluid pump, a gas valve and a PCB control box.

[0006] The boiler unit is preferably a self contained unit comprising the components required for the production of domestic heat and domestic hot water.

[0007] Preferably, the connection interface comprises a plurality of connections between the boiler unit and the manifold unit.

[0008] The pipework system may incorporate a fluid supply and a fluid return, each being connected to the boiler unit via the manifold unit.

[0009] The manifold unit preferably provides the boiler unit with a connection interface to a power supply.

[0010] The power supply is preferably an electrical power supply.

[0011] The connection interface to the power supply is preferably a plug and socket, the arrangement being such that the plug is received by the socket automatically as the boiler unit is assembled on the manifold unit.

[0012] In an embodiment of the present invention the manifold unit preferably provides the boiler unit with a connection interface to a gas inlet pipe.

[0013] The manifold unit preferably provides the boiler unit with a connection interface to a gas outlet duct.

[0014] The manifold unit preferably provides the boiler unit with a direct connection to the gas outlet duct.

[0015] The connections of the connection interface are preferably quick release connections.

[0016] Preferably, the connections of the connection interface comprise means for isolating the pipework system, which may be used before disconnecting the boiler unit from the manifold unit.

[0017] Preferably, the boiler unit comprises means to isolate the connections.

[0018] The manifold unit preferably comprises means to isolate the connections.

[0019] The isolation means may be used to prevent the flow of fluid through the connections. The isolation means may be used to stop the flow of a fluid through the connections prior to the removal of the boiler unit from the manifold unit. The avoidance of the flow of a fluid through the connections prior to the removal of the boiler unit from the manifold unit prevents the requirement for the a draining down of the pipework system or the boiler assembly.

[0020] The isolation means is preferably located at the front of the boiler assembly. The location of the isolation means at the front of the boiler assembly provides easy access to the isolation means.

[0021] The boiler assembly is preferably capable of being wall mounted or floor standing. The location of the isolation means at the front of the boiler assembly facilitate the boiler assembly being wall mounted or floor standing.

[0022] The means for isolating the connection is preferably a series of valves.

[0023] Preferably, the manifold unit comprises guide means for guiding the boiler during removal and re-assembly. The guide means helps to ensure that the connections between the boiler unit and the manifold unit are in the correct location in the assembled state.

[0024] The guide means preferably comprises a guide rail along which the boiler unit may slide when assembling and disassembling the boiler assembly.

[0025] The guide rail is preferably a cantilever wherein one end of the guide rail is attached to the manifold unit.

[0026] The guide rail preferably comprises a distal end formed with a tapered region.

[0027] The tapered region of the guide rail is preferably a cone shape.

[0028] The boiler assembly preferably comprises a support rail for supporting the boiler unit during removal and re-assembly.

[0029] The support rail is preferably removable from the manifold unit.

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

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

[0032] The guide means may comprise a plurality of guide rails along which the boiler unit may slide when assembling and disassembling the boiler assembly.

[0033] The boiler unit preferably comprises means to measure pressure.

[0034] The boiler unit preferably comprises control means for controlling the operation of the boiler assembly.

[0035] The boiler unit preferably comprises means for measuring moisture within the boiler unit. The means for measuring moisture is used to provide an alert of any leaks within the boiler unit.

[0036] The boiler unit preferably comprises means for analysing gases. The means for analysing gases is used to provide an analysis of the combustion gases in the outlet and to provide an alert on the combustion rates.

[0037] In one embodiment of the present invention the manifold unit comprises an expansion chamber for the heating pipework system.

[0038] The manifold unit preferably comprises means to measure pressure.

[0039] The boiler assembly preferably comprises security means for preventing unauthorised removal of the boiler unit.

[0040] Preferably the boiler unit is a domestic boiler unit and the pipework system is a domestic pipework system.

[0041] The boiler assembly may comprise a remote management system whereby in use the management system is in communication with the boiler assembly via a modem, the boiler assembly providing analysis information to the management system. The management system may be used to monitor one or more boiler assembly(ies) remotely and detect potential faults.

[0042] According to a second aspect of the present invention there is provided a removable boiler unit characterised in that the boiler unit is detachably connected to a pipework system via a connection interface comprising quick release means.

[0043] The quick release means preferably comprises quick release connections.

[0044] Preferably, the boiler unit comprises means to isolate the connections to the pipework system.

[0045] The pipework system preferably comprises means for isolating the connections.

[0046] The isolation means may be used to prevent the flow of a fluid through the connections. The isolation means 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.

[0047] The means for isolating the connection is preferably a series of valves.

[0048] The connection interface preferably comprises a power connection for providing the boiler unit with a power supply.

[0049] The connection interface preferably comprises a gas pipe connection for providing the boiler unit with a connection to a gas inlet pipe.

[0050] The connection interface preferably comprises an exhaust connection for providing the boiler unit with a connection to a gas outlet duct.

[0051] The boiler unit preferably comprises security means for preventing access to the boiler unit.

[0052] According to a third aspect of the present invention there is provided a heating system characterised in that the system comprises a boiler assembly according

to the first aspect of the present invention.

[0053] According to a fourth aspect of the present invention there is provided a heating system characterised in that the system comprises a boiler unit according to the second aspect of the present invention.

[0054] According to a fifth aspect of the present invention there is provided a method of servicing or repairing a boiler unit of a boiler assembly according to the first aspect 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.

[0055] By replacing the boiler unit with a second boiler unit the heating system may be used while the first boiler unit is being serviced or repaired.

[0056] According to a sixth aspect of the present invention there is provided a method of servicing or repairing a boiler unit according to the second aspect of the present invention, characterised by the method comprising detaching and removing a first boiler unit from a pipework system; then replacing the first boiler unit with a second boiler unit and connecting the second boiler unit to the pipework system.

[0057] By replacing the boiler unit with a second boiler unit the heating system may be used while the first boiler unit is being serviced or repaired.

[0058] The present invention may include any combination of the features or limitations referred to herein.

[0059] The present invention may be carried into practice in various ways, but two embodiments will now be described by way of example only with reference to the accompanying drawings in which:

Figure 1 is a schematic view of a boiler assembly comprising a boiler unit and a manifold unit;

Figure 2 is a side view of the boiler assembly shown in Figure 1;

Figure 3 is an isometric front view of the boiler unit shown in Figures 1 and 2, and shows the boiler unit with a front panel removed;

Figure 4 is an isometric rear view of the boiler shown in Figure 3;

Figure 5 is an isometric front view of the manifold unit shown in Figure 1 with the boiler unit removed;

Figure 6 is a schematic view of a further embodiment of a boiler assembly comprising a boiler unit (shown in ghost form) partially assembled on a manifold unit; .

Figure 7 is a side view of a corner of the manifold unit shown in Figure 6 and a support rail partially removed from the manifold unit; and

Figure 8 is an isometric rear view of the boiler shown in Figure 6.

[0060] Referring to the Figures 1 to 5, 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).

[0061] 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 is connected to the manifold unit 4.

[0062] The boiler unit 2 is a box-like shape comprising a removable front panel 8; two removable side panels 10, 12 each being formed with a handle recess 13; a removable top panel 14; a base panel 16 and a back panel 18. The removable panels of the manifold unit 4 are secured to the unit by a number of screws 20 (not shown in some Figures). The front panel 8 comprises a security lock 22, which helps to prevent unauthorised access to the boiler unit 2. The skilled person will appreciate that any suitable security device may be used to prevent unauthorised access to the boiler unit 2. Disposed below the front panel 8 is a rectangular instrumentation panel 24 that comprises a pressure gauge 26 and a timer 28 for turning the boiler unit 2 on and off. The timer 28 may also be used to indicate when a service is due or to indicate a fault.

[0063] The boiler unit 2 contains an array of standard elements normally found in a domestic boiler including a burner unit 30, a heat exchanger 31, a combustion chamber 32, a fluid pump 34, a pressure switch 36 for a fan, a gas valve 38, a diverter valve 40 for the heat exchanger 31, a water pressure switch 42 and a PCB control box 44. The boiler unit 2 also comprises series of pipe connections 46. The pipe connections 46 are used as water inlet and water outlet ports for the boiler unit 2. One or more of the pipe connections 46 may be used as a gas feed port for the burner 30. The correct rating and design of the connections and the internal pipework would be chosen for the different functions of the connections 46 and internal pipework. Attached to each connection 46 there is an isolation valve 48 (see Figure 1).

[0064] Disposed at each corner of the boiler unit 2 there is a guide channel 50 each of which extend from the back panel 18 in a direction towards the front of the boiler unit 2. The back panel 18 is also formed with an electrical plug element 54, and a circular port 52 that provides an exhaust for a flue of the boiler unit 2.

[0065] The manifold unit 4 is a substantially L-shaped structure comprising a rectangular rear box section 60 and a rectangular base section 62. The rear box section 60 contains an expansion chamber 64 that is used for the pipework, which contains the heated water. An upper region of the rear box section 60 is formed with an elec-

trical socket 67 and a flue port 66 for the exhaust gases of the boiler unit 2. When the boiler unit 2 is assembled on the manifold unit 4 the flue port 66 aligns and connects with the circular port 52 of the boiler unit 2 and the electrical plug element 54 of the boiler unit 2 is received by the electrical socket 67 of the manifold unit 4.

[0066] The uppermost panel 70 of the rear box section 60 is formed with a series of circular holes 72. One or more pipes of the heating pipework system may use the holes 72 for access into the manifold. The uppermost panel 70 is also formed with a push-out circular section 74, which may be removed to allow access by an exhaust flue (not shown).

[0067] The manifold unit 4 comprises four guide rails 76 extending in a direction substantially parallel to the base section 62. In the assembled state of the boiler assembly the rails 76 are received by the channels 50 of the boiler unit 2 and help provide support for the boiler unit 2.

[0068] The base section 62 comprises a series of pipelines 78 the respective distal ends of which are held on a horizontal bracket 80. Connected to the respective distal ends of the pipelines 78 are respective isolation valves 82. In the assembled state the isolation valves 82 of the manifold unit 4 are connected to the isolation valves 48 of the boiler unit 2 (see Figure 1).

[0069] The boiler assembly 1 may be fitted to an existing domestic heating system or alternatively a whole new heating pipework network may be fitted and connected to the boiler assembly 1. The manifold unit 4 is fixed to the wall or floor of the building. The various water pipes of the heating network are connected to the manifold unit 4. If the boiler unit 2 uses gas then the gas pipe is connected to the manifold unit 4 and the gas exhaust flue is connected to the manifold unit 4. The skilled person will appreciate that any type of boiler may be used, such as an electric boiler or an oil boiler. The boiler unit 2 receives electrical power via the electrical plug 54 and socket 67.

[0070] When the boiler unit 2 is due a service or requires repair the maintenance person isolates the heating pipework system from the boiler unit 2 and the gas supply by closing the isolation valves 48 and 82. The connections between the respective isolation valves 48 and 82 are undone. The boiler unit 2 is then easily removed from the manifold unit 4 using the handles 13. When removing the boiler unit 2 from the manifold unit 4, the guide channels 50 slide on the rails 76, the electrical connection between plug 54 and the socket 67 is broken and the connection between the circular port 52 and the flue port 66 is broken. There is no need to remove the front panel 8 of the boiler unit 2 as the work is carried out off-site.

[0071] Once the boiler unit 2 has been removed from the manifold unit 4 a replacement boiler unit may be assembled onto the manifold unit 4 and all the connections made so that the heating system may be used while the original boiler unit is being serviced off-site.

[0072] A particular benefit of the manifold unit 4 is that some of the elements of a boiler assembly, such as the expansion chamber 64 and the exhaust flue port 66, which do not normally require servicing may be contained in the manifold unit 4. The boiler unit 2 may contain only those elements that require regular servicing or are likely to need repair. The other elements of a domestic boiler assembly can be left behind when the boiler unit 2 is taken away.

[0073] The boiler unit may comprise a device to measure pressure within one or more of the elements of the boiler assembly, a device for analysing moisture within the boiler unit and a device for measuring the various gases within the boiler assembly. The information 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.

[0074] The boiler assembly may comprise a remote management system whereby in use the management system is in communication with the boiler assembly via a modem, the boiler assembly providing analysis information to the management system. The management system may be used to monitor one or more boiler assembly(ies) remotely and detect potential faults.

[0075] 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 valve adjacent to the connections of the pipework system. The boiler unit may also comprise isolation valves adjacent to the connections.

[0076] 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 connection for providing the boiler unit with a power supply and a gas pipe connection for providing the boiler unit with a connection to a gas inlet pipe. The connection interface may also comprise an exhaust connection for providing the boiler unit with a connection to a gas outlet duct.

[0077] 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.

[0078] Referring to the Figures 6 to 8, 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).

[0079] In this particular embodiment the manifold unit

4 comprises four guide rails 90 extending in a direction substantially parallel to the base section 62. In the assembled state of the boiler assembly the rails 90 are received by channels 95 of the boiler 7 unit 2 and help provide support for the boiler unit 2. The guide rails 90 are each attached to the manifold at one of their respective end so forming a cantilever. The guide rails 90 each have a circular cross section. The distal end 91 of each guide rail 90 is a cone shape to aid the insertion into the respective channels 95.

[0080] The boiler assembly 1 also comprises two removable support rails 94. The support rails 94 have an L-shaped vertical cross section and are used during the assembly and disassembly of the boiler unit 2 from the manifold unit 4 to provide support of the boiler unit 2. In the assembled state the support rails 94 can be removed from boiler assembly 1.

20 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 boiler unit and the manifold unit each comprising respective means to isolate the connection.
2. A boiler assembly as claimed in claim 1 wherein the boiler unit is a self-contained unit comprising the components required for the production of heat, the components being a fan motor, a fan pressure switch, a burner unit, a heat exchanger, a fluid pump, a gas valve and a PCB control box.
3. A boiler assembly as claimed in claim 1 wherein the boiler unit is a self contained unit comprising the components required for the production of hot water, the components being a fan motor, a fan pressure switch, a burner unit, a heat exchanger, a fluid pump, a gas valve and a PCB control box.
4. A boiler assembly as claimed in claim 1 wherein the boiler unit is a self contained unit comprising the components required for the production of domestic heat and domestic hot water.
5. A boiler assembly as claimed in any one of claims 1 to 4 wherein, the connection interface comprises a plurality of connections between the boiler unit and the manifold unit.
6. A boiler assembly as claimed in claim 5 wherein the pipework system incorporates a fluid supply and a fluid return, each being connected to the boiler unit via the manifold unit.

7. A boiler assembly as claimed in any one of claims 5 or 6 wherein the connections of the connection interface are quick release connections.
8. A boiler assembly as claimed in any one of claims 1 to 7 wherein the isolation means is located at the front of the boiler assembly. 5
9. A boiler assembly as claimed in any one of the preceding claims wherein the boiler assembly is capable of being wall mounted or floor standing. 10
10. A boiler assembly as claimed in any one of the preceding claims wherein the manifold unit comprises guide means for guiding the boiler during removal and re-assembly. 15
11. A boiler assembly as claimed in claim 1 wherein the boiler assembly comprises a support rail for supporting the boiler unit during removal and re-assembly. 20
12. A boiler assembly as claimed in claim 1 wherein the boiler assembly comprises security means for preventing unauthorised removal of the boiler unit. 25
13. A boiler assembly as claimed in any one of the preceding claims wherein the boiler assembly comprises a remote management system whereby in use the management system is in communication with the boiler assembly via a modem, the boiler assembly providing analysis information to the management system. 30
14. A heating system comprising a boiler assembly as claimed in any one of claims 1 to 13. 35
15. A method of servicing or repairing a boiler unit of a boiler assembly according to any one of claims 1 to 13, 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. 40

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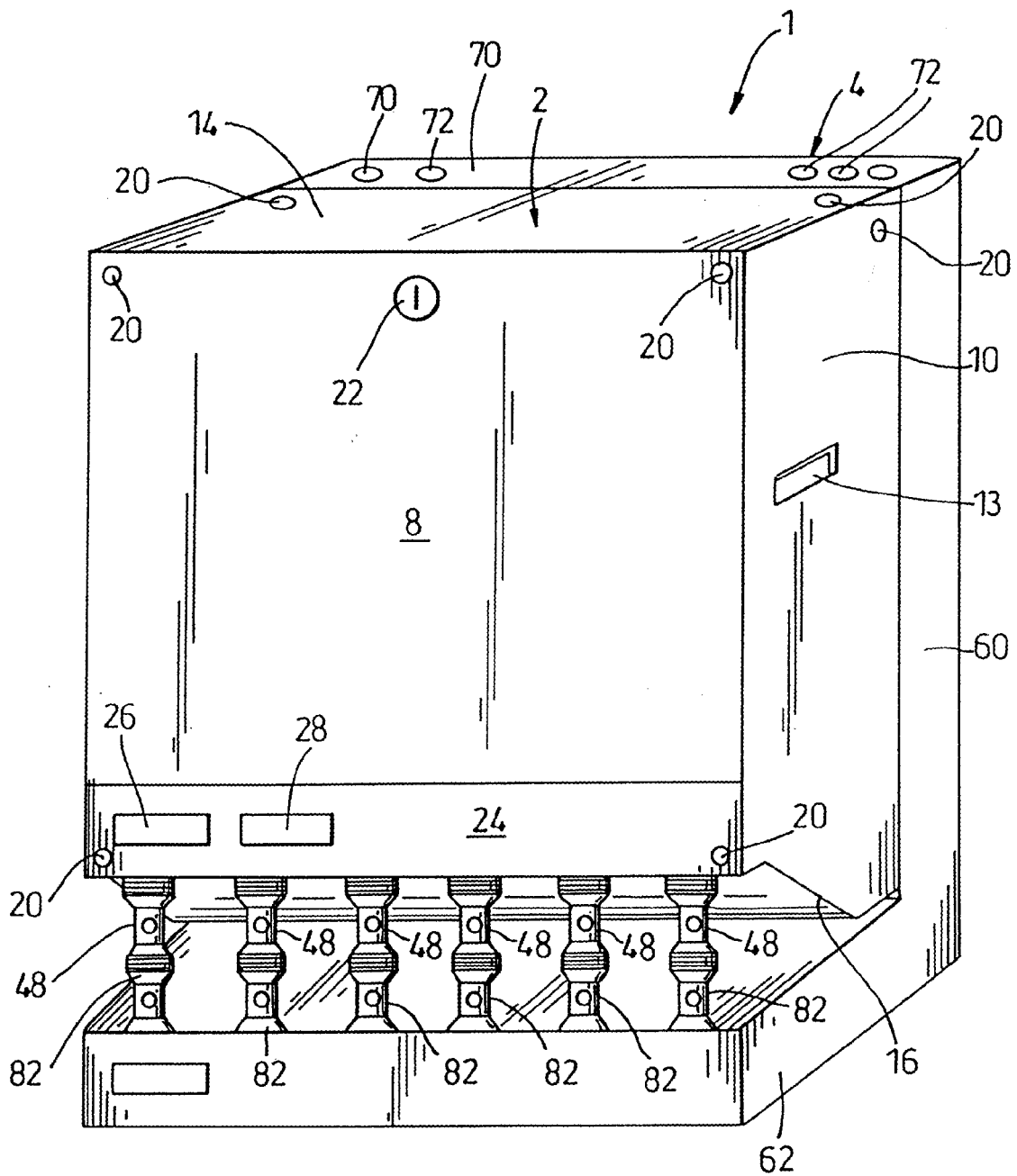


Fig. 1

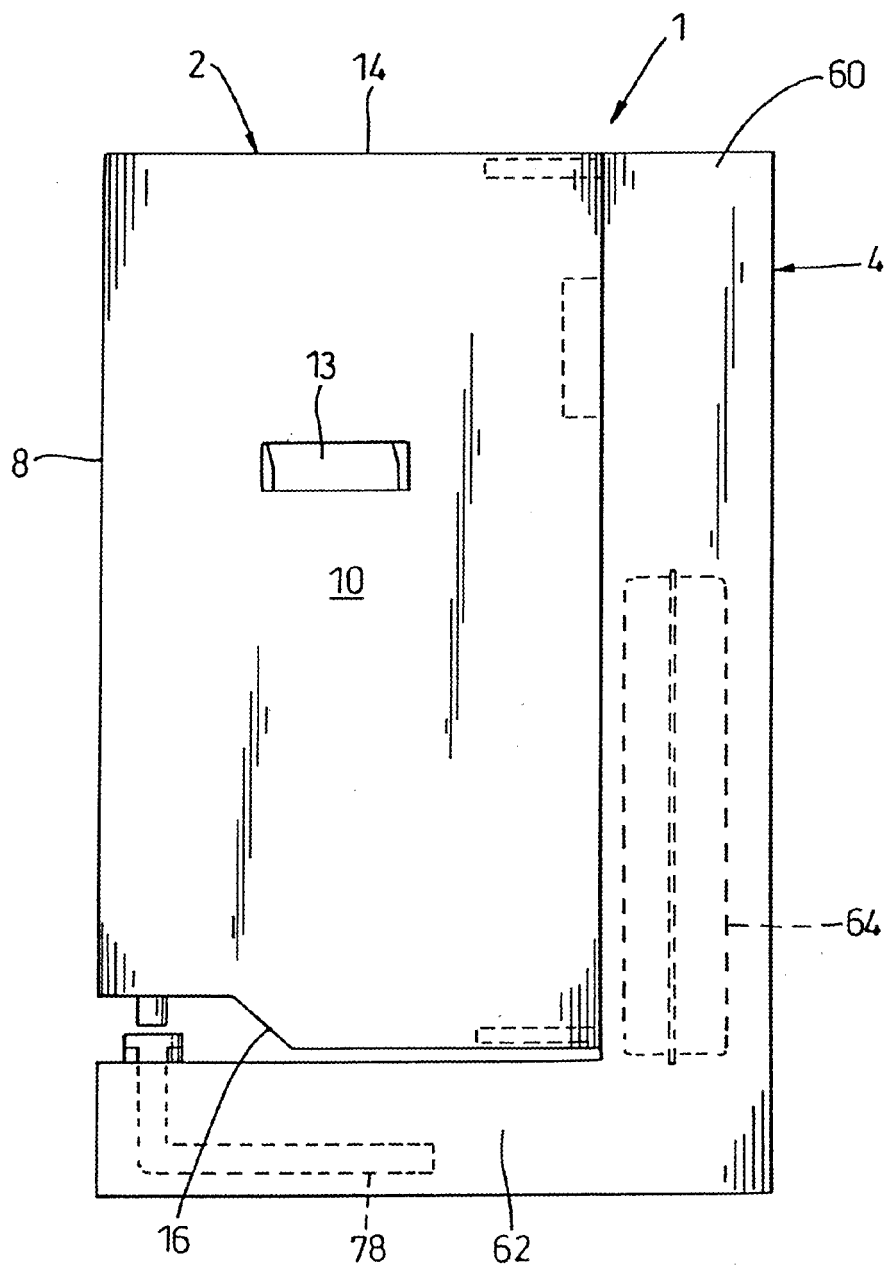


Fig. 2

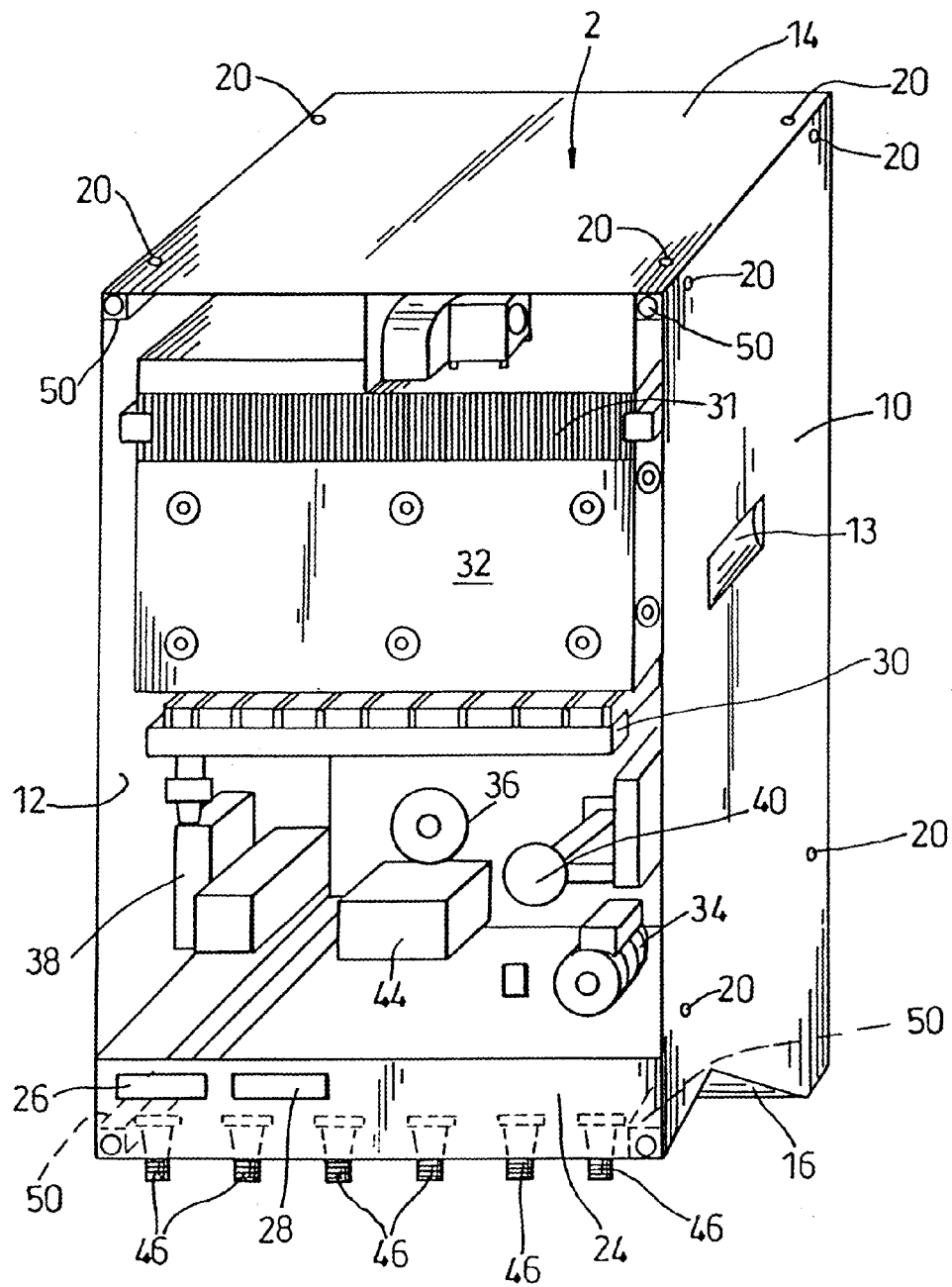


Fig. 3

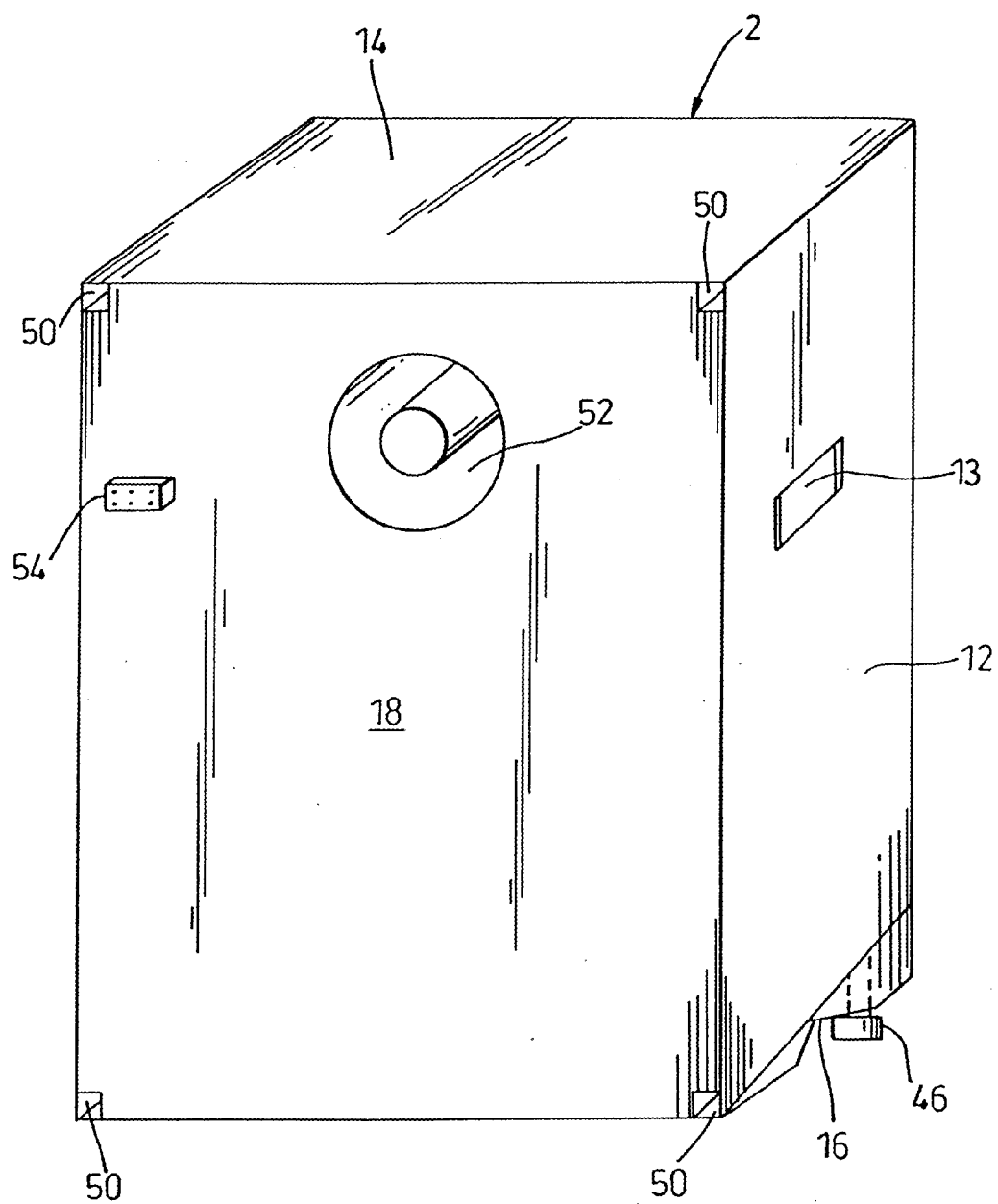


Fig. 4

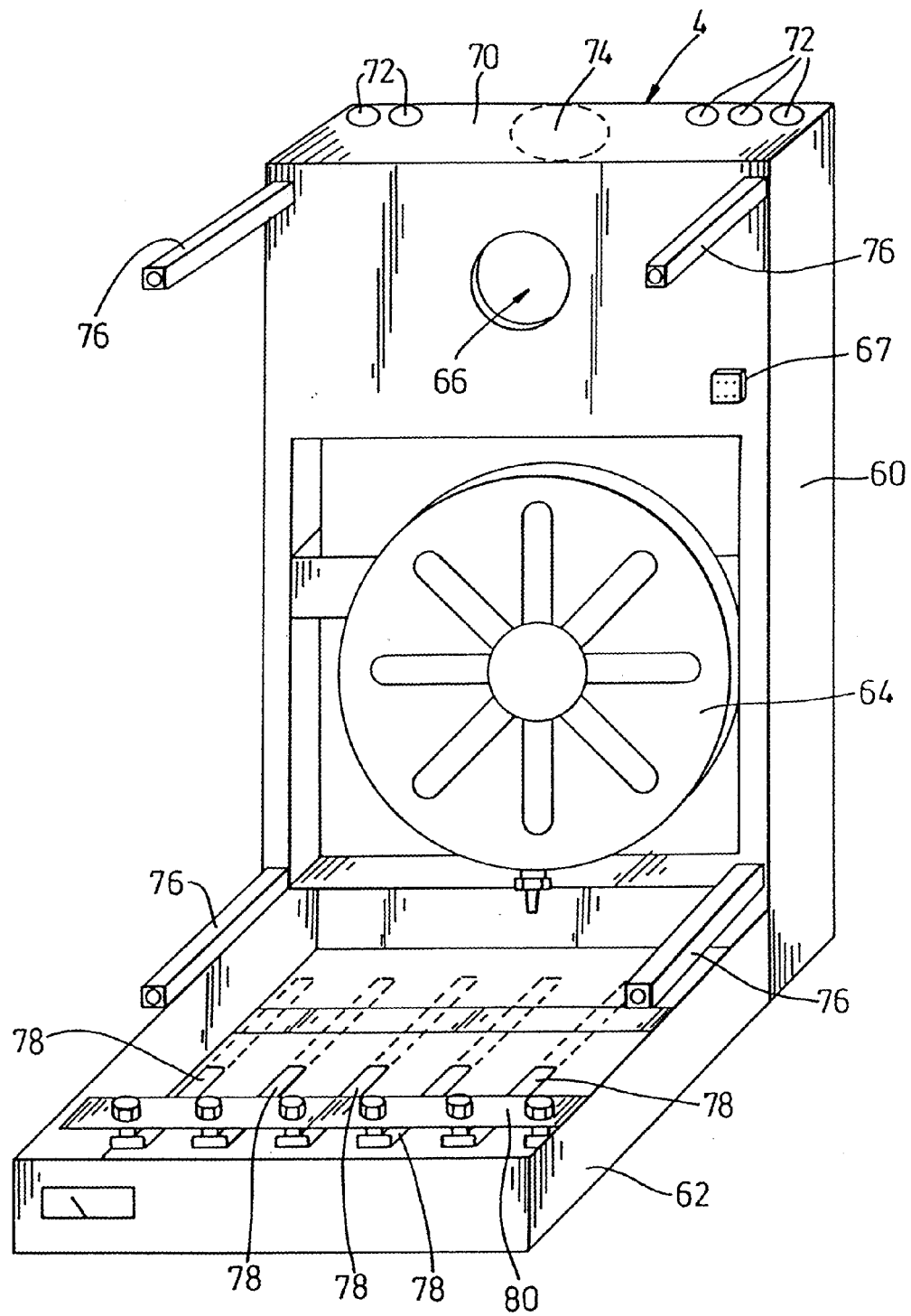


Fig. 5

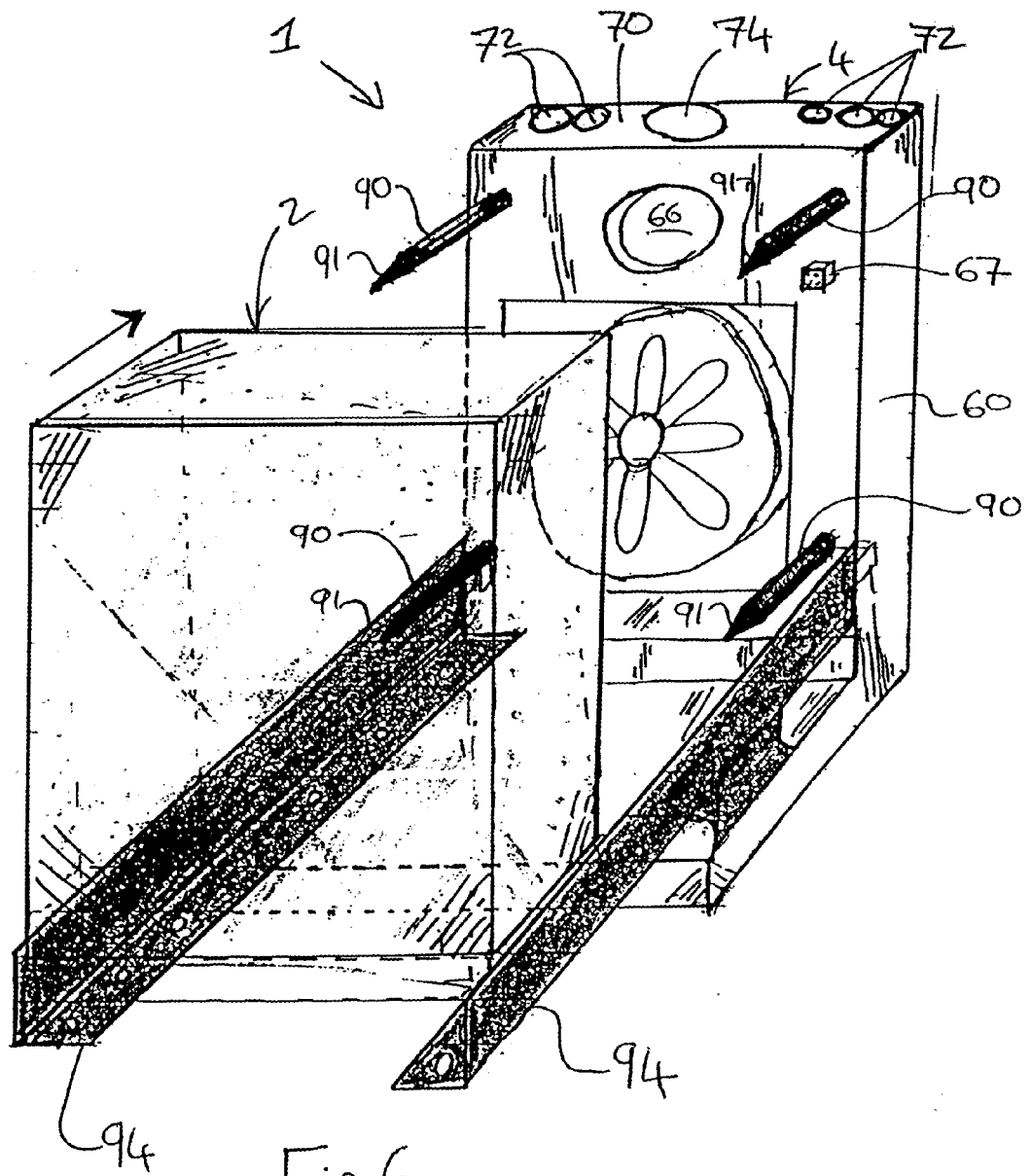
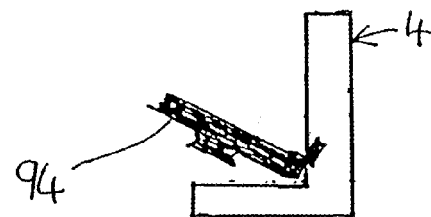


Fig 6



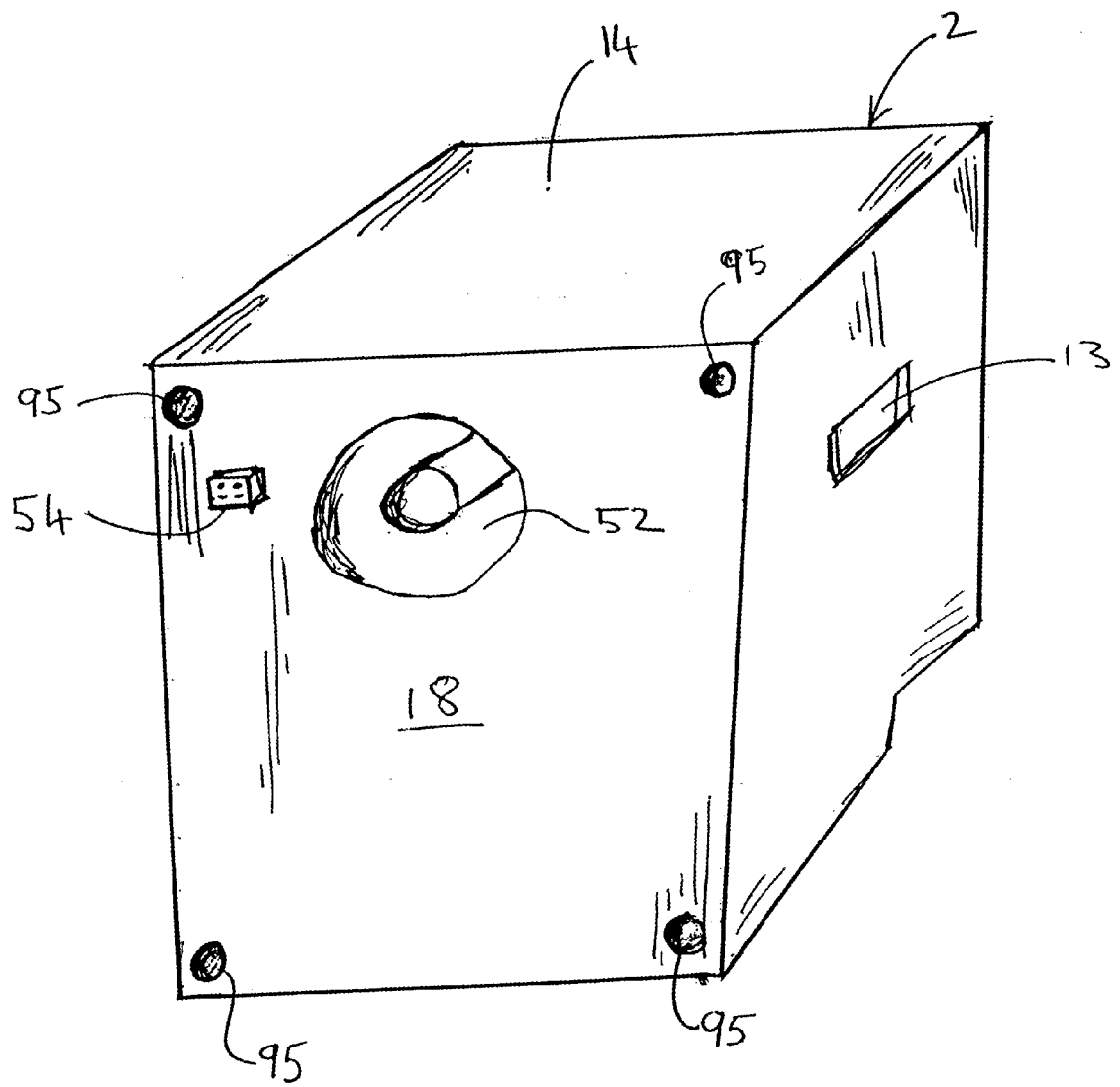


Fig 8



EUROPEAN SEARCH REPORT

Application Number
EP 10 18 6215

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 9 August 2011	Examiner García Moncayo, O
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 10 18 6215

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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