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(72) Inventors:
• **Carlton, Clifford**
Goodlettsville, TN 37072 (US)
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(74) Representative:
**Grünecker, Kinkeldey,
Stockmair & Schwanhäusser**
Anwaltssozietät
Maximilianstrasse 58
80538 München (DE)

(71) Applicant:
State Industries, Inc.
Ashland City, TN 37015 (US)

(54) **Water heater**

(57) A water heater (10) having a combustion air inlet and a flue gas outlet (14). A manifold assembly (16) is provided which includes a box section (30), a flue gas port (32), a combustion air port (34) and a combustion air inlet collar (36). The combustion air inlet collar (36) communicates with the combustion air port (34) through the interior of the box section (30). A combination combustion air inlet and flue gas outlet assembly (14) is provided and includes a combustion air inlet tube (18) and a flue gas outlet tube (20) mounted concentrically inside the combustion air tube (18). The combustion air tube (18) is connected at one end to the box section (30) of the manifold and is connected at the other end with the atmosphere. The flue tube (20) is connected at one end to the flue gas inlet port (32) on the manifold and communicates with the atmosphere at the other end. An air blower (40) is mounted on the water heater (10). A combustion air tube (42) is connected at one end to the combustion air port (34) of the manifold and is connected at its other end to an air assembly box (43) mounted on the top of the water heater (10). The air blower (40) is operable to draw fresh combustion air through the combustion air tube (42) and then into the combustion chamber (19) of the water heater (10). A flue gas tube (38) is connected at one end to the flue gas port (32) of the manifold and is connected at the other end to the blower (40), which is operable to exhaust the flue gases from the combination combustion air inlet and flue gas outlet assembly (14).

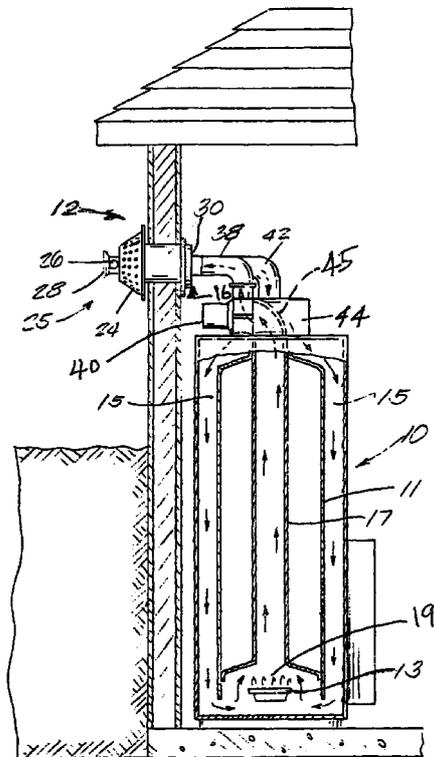


FIG. 1

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Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] Not applicable.

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STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not applicable.

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REFERENCE TO MICROFICHE APPENDIX

[0003] Not applicable.

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BACKGROUND OF THE INVENTION

[0004] This invention relates to a water heater and more specifically to a water heater that is directly vented to the outside through the wall of the space in which the water heater is located. An air blower forces combustion air through a manifold assembly and then into the combustion chamber of the water heater. The air blower also draws products of combustion from the combustion chamber through the manifold assembly and then out to the atmosphere.

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[0005] A water heater of this general type is shown and described in U.S. Patent No. 5,020,512. The present invention is believed to be a patentable improvement over this prior water heater.

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BRIEF SUMMARY OF THE INVENTION

[0006] A water heater having a combustion air inlet and a flue gas outlet including an air blower mounted on the heater. The blower is operable to draw fresh combustion air through the combustion air tube and into the combustion chamber of the heater. A flue gas tube is connected to the flue gas outlet. A manifold assembly is in communication with the combustion air tube and the flue gas tube. The manifold assembly is adapted to receive and conduct combustion air to the combustion air tube. The manifold assembly is further adapted to receive flue gas from the flue gas tube and direct the flue gas through the assembly and then out to atmosphere. A combination combustion air inlet and flue gas outlet assembly is adapted to receive combustion air from the atmosphere and conduct the combustion air to the manifold assembly. The combination combustion air inlet and flue gas outlet assembly is further adapted to receive flue gas from the manifold and to conduct the flue gas to the atmosphere.

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BRIEF DESCRIPTION OF THE DRAWINGS

[0007]

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Fig. 1 is a partially schematic vertical side elevation

view of a water heater equipped with the combustion air and the products of combustion flue gas piping system of the present invention;

Fig. 2 is a horizontal cross-sectional view of the combustion air and products of combustion flue gas piping system;

Fig. 3 is a top view of the manifold assembly used in the system shown in Fig. 1; and

Fig. 4 is a right-hand end elevation view of the manifold assembly shown in Fig. 3.

DETAILED DESCRIPTION OF THE INVENTION

[0008] Referring to the drawings, Fig. 1 shows a gas-fired water heater 10 equipped with a combustion air/flue gas piping system 12 as shown in Figs. 2, 3 and 4. As shown in Fig. 1, the internal construction of water heater 10 includes a watertight tank 11, a gas-fired burner 13 mounted in a combustion chamber 19, a passageway 15 to conduct combustion air to the burner and a flue tube 17 for carrying the products of combustion out the top of the water heater.

[0009] As shown in Fig. 2, piping system 12 includes a manifold assembly 16 and a combination combustion air inlet and flue gas outlet assembly 14.

[0010] Assembly 14 is comprised of an outer tube member 18 and an inner tube member 20 mounted concentrically inside tube member 18. The inner tube 20 extends through the wall 22 of the space in which the heater is installed.

[0011] A perforated guard member 24 is mounted on the end of tube 20 outside of wall 22. A filling 25 is mounted on the end of tube 20. The filling 25 has side openings 26 and an end cap 28.

[0012] Referring to Figs. 2, 3 and 4, manifold assembly 16 is mounted on the right-hand end of assembly 14 adjacent the inside surface of wall 22.

[0013] Manifold assembly 16 is comprised of a manifold box section 30 and a flue gas port 32 mounted in box 30 and extending through the box as shown in Fig. 3. A combustion air port 34 is mounted on the face of box 30 and communicates with the interior of box 30 as shown in Fig. 3. Assembly 16 has a collar 36 on box 30 which, as shown in Fig. 2, fits inside the left end of tube 18.

[0014] As shown in Figs. 1 and 2, a combustion air tube 42 is connected at one end to combustion air port 34 of manifold assembly 16 and is connected at its other end to an air assembly box 44 mounted on the top of heater 10. A flue gas tube 38 is connected at one end to the flue gas port 32 of manifold assembly 16 and is connected at its other end to a blower 40 mounted at one end of air assembly box 43. An internal baffle 45 functions to direct combustion air from tube 42 into passageway 15. The baffle 45 further functions to direct flue gas from flue tube 17 to tube 38.

OPERATION

[0015] With blower 40 (Fig. 1) energized, fresh combustion air will be drawn into combination combustion air inlet and flue gas outlet assembly 14 through perforated guard 24. Combustion air flows through tube 18 around the outside of tube 20 as shown by the arrows in Fig. 2. The fresh combustion air exits into manifold assembly 16 as shown in Fig. 2. The combustion air flows through manifold box section 30 to outlet port 34.

[0016] From port 34, the air flows through tube 42 to the air assembly box 44 (Fig. 1). Box 44 has an internal baffle 45 therein, which directs the flow of combustion air into passageway 15 of the water heater. Blower 40 draws the combustion air into the internal passageway 15 of heater 10, which directs the flow to the burner 13 in the combustion chamber of the heater 10.

[0017] The products of combustion, *i.e.*, flue gases, flow upwardly inside the heater through tube 17 and exit the heater into tube 38 after passing through air assembly box 43 as shown by the arrows in Fig. 1. The flue gases flow through tube 38 to inlet port 32 of manifold 16. The flue gases then flow through port 32 into tube 20 (Fig. 2), then through tube 20 and then out to the outside atmosphere through openings 26 at the end of tube 20 (Fig. 2).

[0018] While the invention herein has been shown and described in what is presently conceived to be the most practical preferred embodiment, it will be obvious to one of ordinary skill in the art that many modifications may be made thereof within the scope of the invention, which scope is not to be limited except by the appended claims.

Claims

1. A water heater having a combustion chamber, a combustion air inlet and a flue gas outlet located at the top of the water heater, comprising:

- (a) a manifold assembly (16) including a box section (30), a flue gas port (32), a combustion air port (34) and a combustion air inlet collar (36), said combustion air inlet collar (36) communicating with said combustion air port (34) through the interior of said box section (30);
- (b) a combination combustion air inlet and flue gas outlet assembly (14) including a combustion air inlet tube member (18), a flue gas outlet tube member (20) mounted concentrically inside said tube member (18), said tube member (18) connected at one end to said box section (30) at said combustion air inlet collar (36), said tube member (18) communicating with the atmosphere and its other end, said tube member (20) connected at one end to said flue gas inlet port (32) and communicating with the

atmosphere at its other end;

- (c) a combustion air assembly box (44) mounted on the top of the water heater;
- (d) a combustion air tube (42) connected at one end to said combustion air port (34) and connected at its other end to said combustion air assembly box (44);
- (e) a flue gas tube (38) communicating at one end with the flue gas outlet of the water heater and connected at the other end to said flue gas port (32); and
- (f) an air blower (40) operable to draw combustion air into the water heater through said combustion air tube (42) and further operable to draw flue gas out of the water heater through flue gas outlet tube (38).

2. A combination combustion air and flue gas exhaust system for a water heater comprising:

- (a) a manifold assembly (16) including a box section (30), a flue gas port (32), a combustion air port (34) and a combustion air inlet (36), said combustion air inlet collar (36) communicating with said combustion air port (34) through the interior of said box section (30);
- (b) a combination combustion air inlet and flue gas outlet assembly (14) including a combustion air inlet tube member (18), a flue gas outlet tube member (20) mounted concentrically inside said tube member (18), said tube member (18) connected at one end to said box section (30), said tube member (18) communicating with the atmosphere and its other end, said tube member (20) connected at one end to said flue gas port (32) and communicating with the atmosphere at its other end;
- (c) a combustion air assembly box (44) mounted on the top of the water heater;
- (d) a combustion air tube (42) connected at one end to said combustion air port (34) and connected at its other end to said air assembly box (44);
- (e) a flue gas tube (38) communicating at one end with the flue gas outlet of the water heater and connected at the other end to said flue gas port (32); and
- (f) an air blower operable to draw combustion air into the water heater through said combustion air tube (42) and further operable to draw flue gas out of the water heater through flue gas outlet tube (38).

3. A combination combustion air and flue gas exhaust system for a water heater according to Claim 1 in which there is a combustion air assembly box (44) through which combustion air is drawn into the combustion chamber of the water heater by the

operation of said air blower (40).

4. A water heater having a combustion chamber, a combustion air inlet and a flue gas outlet located at the top of the water heater comprising:

(a) a manifold assembly (16) including a box section (30), a flue gas port (32), a combustion air port (34) and a combustion air inlet (36), said combustion air inlet (36) communicating with said combustion air port (34) through the interior of said box section (30);

(b) a combination combustion air inlet and flue gas outlet assembly (14) including a combustion air inlet tube member (18), a flue gas outlet tube member (20) mounted concentrically inside said tube member (18), said tube member (18) connected at one end to said box section (30), said tube member (18) communicating with the atmosphere and its other end, said tube member (20) connected at one end to said flue gas port (32) and communicating with the atmosphere at its other end;

(c) a combustion air assembly box (44) mounted on the top of the water heater;

(d) a combustion air tube (42) connected at one end to said combustion air port (34) and connected at its other end to said air assembly box (44);

(e) a flue gas tube (38) communicating at one end with the flue gas outlet of the water heater and connected at the other end to said flue gas port (32); and

(f) an air blower operable to draw combustion air into the water heater through said combustion air tube (42) and further operable to draw flue gas out of the water heater through flue gas outlet tube (38).

5. A water heater having a combustion chamber, a combustion air inlet and a flue gas outlet comprising:

(a) an air blower (40) mounted on a water heater;

(b) a combustion air tube (38) connected to said air blower (40), said air blower (40) operable to draw fresh combustion air through said tube (42) and then into the combustion chamber of the water heater;

(c) a flue gas tube (38) connected to the flue gas outlet of the water heater;

(d) a manifold assembly (16) communicating with said flue gas tube (38) and said combustion air tube (42), said manifold assembly (16) adapted to receive and conduct combustion air to said combustion air tube (42), said manifold assembly (16) further adapted to receive flue

gas from said flue gas tube (38); and

(e) a combination combustion air inlet and flue gas outlet assembly (14) adapted to receive combustion air from the atmosphere and conduct said combustion air to said manifold assembly (16), said combination combustion air inlet and flue gas outlet assembly (14) further adapted to receive flue gas from said manifold assembly (16) and conduct said flue gas to the atmosphere.

6. A water heater according to Claim 3 in which said combination combustion air inlet and flue gas outlet assembly (14) includes a combustion air inlet tube member (18) and a flue gas outlet tube member (20) mounted concentrically inside said tube member (18), said tube member (18) adapted to conduct atmospheric air to said manifold assembly (16), said tube member (20) adapted to conduct flue gas from said manifold assembly (16) to the atmosphere.

7. A water heater according to Claim 5 in which said manifold assembly (16) includes a box section (30) through which combustion air flows from said combination combustion air inlet and flue gas outlet assembly (14) to said combustion air tube (42).

8. A method of heating water in a water heater, including a water-tight tank (11), a combustion chamber (19), a gas burner (13) in the combustion chamber, a flue gas outlet tube (17) connected to the combustion chamber (19), a blower (40), a manifold assembly (16) having a combustion air port (34) and a flue gas port (32), a combustion air tube (42) connected to the combustion air port (34) at one end and communicating with the combustion chamber (19) at the other end, a flue gas tube (38) connected to the flue gas port (32) at one end and communicating with the flue gas outlet tube (17) of the water heater at the other end, comprising the steps of:

(a) energizing the blower (40) to draw combustion air into the manifold assembly (16) and then from the manifold assembly (16) through the combustion air tube (42) to the combustion chamber (19) of the water heater;

(b) mixing combustion air with gas produced by the gas burner (13) and burning the mixture in the combustion chamber (19) to produce heat;

(c) energizing the blower (40) to draw flue gases out of the water heater and into the flue gas tube (38) which carries the flue gases to the manifold assembly (16).

9. The method of Claim 8 in which combustion air flows out the manifold assembly (16) and into the

combustion air tube (42) through a combustion air port (34) on the manifold assembly (16).

- 10.** The method of Claim 9 in which flue gases flowing from the flue gas tube (38) to the manifold assembly (16) flow through the flue gas port (32) of the manifold assembly (16). 5

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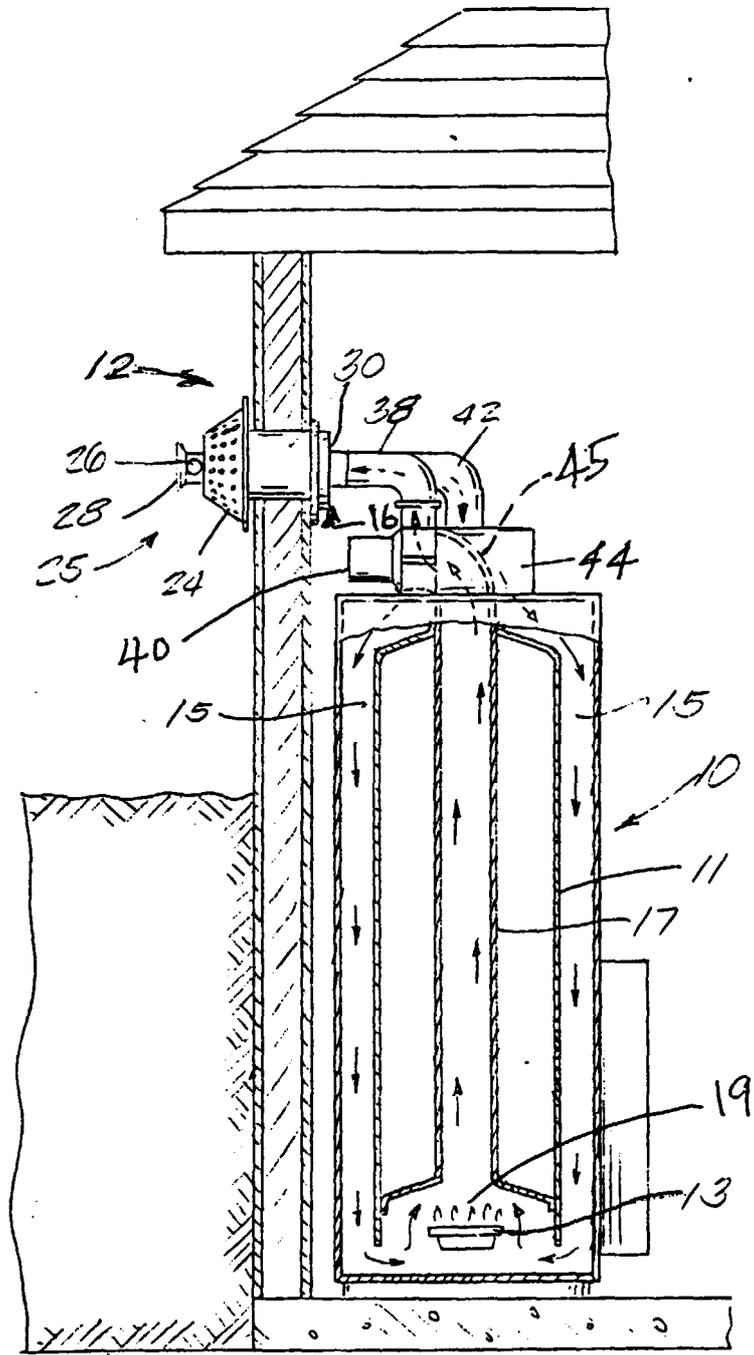
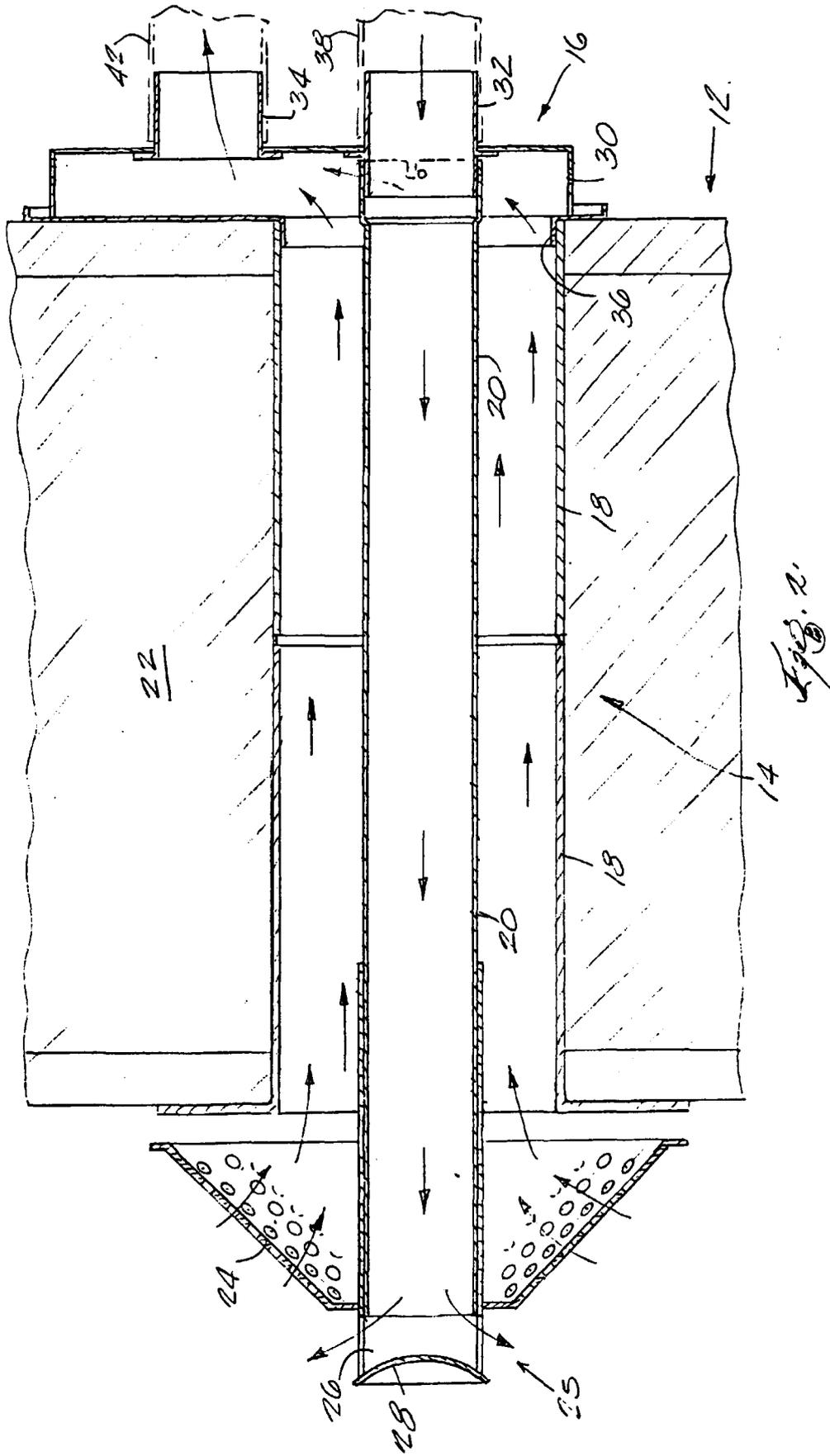
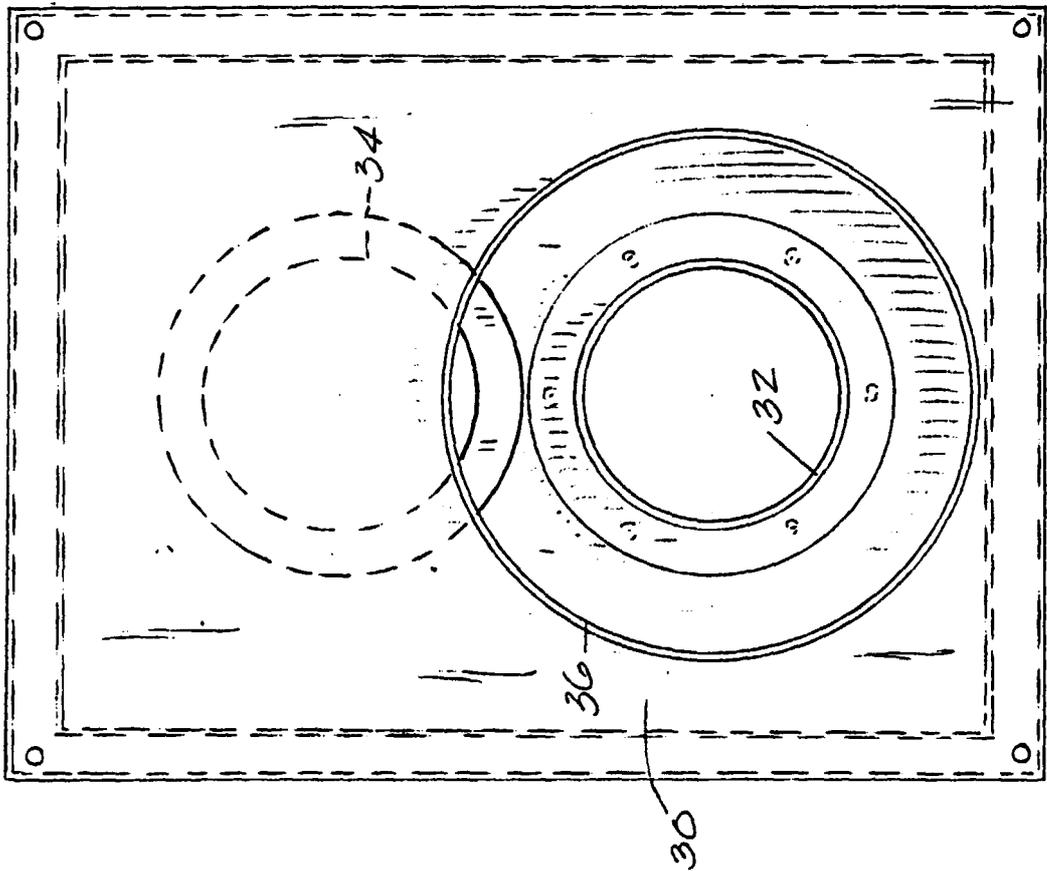
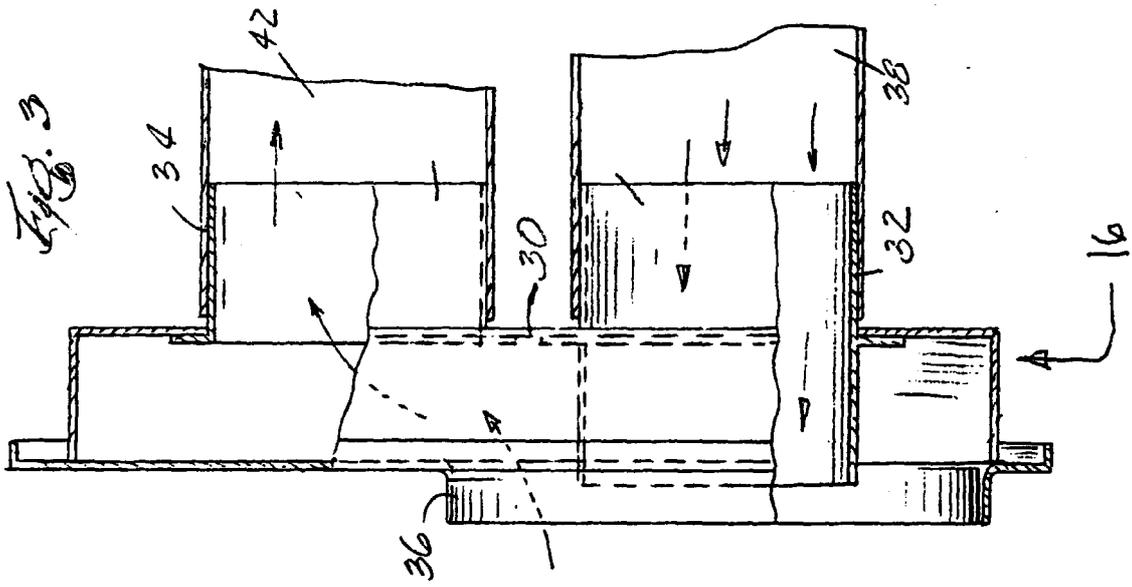


Fig. 1







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EUROPEAN SEARCH REPORT

Application Number
EP 00 10 6271

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	US 4 262 608 A (JACKSON BERT W) 21 April 1981 (1981-04-21) * column 4, line 58 - column 6, line 16 * * column 6, line 25 - line 44 * * figures 1,2 *	1-10	F23L17/04
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D,A	US 5 020 512 A (VAGO OTTO Z ET AL) 4 June 1991 (1991-06-04) * column 2, line 6 - line 12 * * column 2, line 48 - column 3, line 42 * * column 4, line 3 - line 36 * * figures 1-4 *	1,2,4,5,8	TECHNICAL FIELDS SEARCHED (Int.Cl.7) F23L F23J F24H
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 21 June 2000	Examiner Coquau, S
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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