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Applicant: **ING. A. BERETTA S.p.A.**
Via Risorgimento, 13
I-22053 Lecco Como(IT)

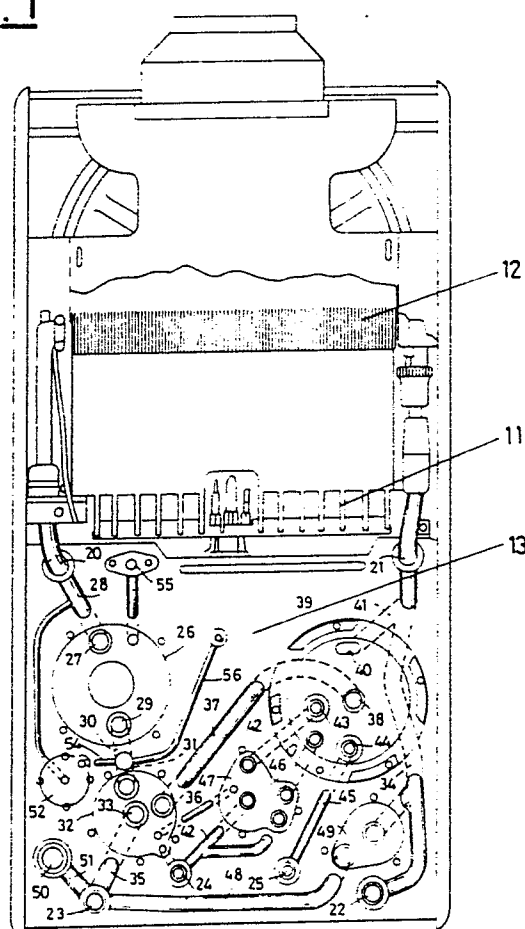
Inventor: **Pastorino, Giorgio**
Via Carlo Cattaneo, 31
I-22053 Lecco(IT)

Representative: **Faraggiana, Vittorio, Dr. Ing.**
et al
Ingg. Guzzi e Ravizza S.r.l. Via Boccaccio, 24
I-20123 Milano(IT)

Integrated hydraulic circuit for hot-water heating boilers for heating and sanitary use.

An integrated hydraulic circuit for hot-water heating boiler and water for sanitary uses, forms a plurality of connections between hydraulic components of the boiler, among which at least an accelerator, a secondary water-water heat-exchanger and a 3-way valve for selectively deviating the flow of water from the accelerator to the said heat-exchanger or to a heating circuit. The circuit is realized by the joining of two facing plate-shaped elements, channel-shaped passages being formed in at least one of them and the elements being joined in a watertight manner at their interface at least in the region of the peripheral passages; provision being made on the said circuit for the fixing of at least the accelerator, the secondary heat-exchanger and the 3-way valve, and provision also being made for inlet and outlet connections for a primary heat-exchanger, a heating system and a sanitary water system.

Fig. 1



INTEGRATED HYDRAULIC CIRCUIT FOR HOT-WATER HEATING BOILERS FOR HEATING AND SANITARY USE

Hot-water heating boilers are known, typically of the kind known as well as wall-fixed boilers, which comprise a primary heat-exchanger where the water for feeding a heating system is heated by a gas flame; this water also supplies a water-water exchanger for producing hot water for sanitary uses.

The hydraulic circuit of a boiler of such type provides not only for connections to the exchangers and the water distribution systems, but also for a large number of other circuit components such as the accelerator, by-pass valves and thermostat valves for deviating the flow to the different end-uses and valves sensitive to the instantaneous throughput for regulation of the combustible gas, and so on.

All these elements of the hydraulic circuit call for a complicated system of connector pipes, which in the boiler are relatively bulky and are somewhat time-consuming as regards their connection to the single components.

The present invention obviates the inconveniences mentioned above by embodying a pre-formed hydraulic circuit that materializes the hydraulic connections between different components of the boiler and also acts as a support element for at least some of them.

In accordance with the invention, a hydraulic circuit forming a plurality of connector pipes between boiler hydraulic components, including at least an accelerator, a secondary water-water heat-exchanger and a three-way valve for selectively deviating the flow of water from the accelerator to the said heat-exchanger or to a heating circuit, is in particular embodied by the union of two facing plate-shaped elements, channel-shaped passages being formed in at least one of them and the elements being joined in a tight manner at their interface at least in the region of the peripheral passages, provision being made on the said circuit for fixing at least the accelerator, the secondary heat-exchanger and the 3-way valve, and provision being also made for inlet and outlet connections for a primary heat-exchanger, a heat system and a sanitary water system.

The objects and advantages of the present invention, and the particular utility of a hydraulic circuit formed according to the innovative conception in question, will become more apparent from an examination of the following illustrative and not limiting description of one form of embodiment thereof, illustrated in the appended drawings, in which:

Figure 1 is an overall diagrammatic view of a boiler, showing how the circuit according to the invention can be accepted therein;

Figure 2 is a plan view of a circuit according to the invention;

Figures 3 and 4 are partial sectional views taken through the planes of lines III-III and IV-IV in Figure 2.

As is shown in Figure 1 a boiler typically of the kind known as wall-fixed, provides for a casing 10, shown partially open in the Figure for the sake of clarity, in which is accepted a burner 11 and a primary heat-exchanger 12 through which the combustion fumes pass.

The lower part of the boiler casing accepts the auxiliary components which, according to the invention, are interconnected by a plate-shaped hydraulic circuit indicated generally by the numeral 13. This circuit is more completely shown in the Figures that follow.

The circuit 13 consists of an upper element 14 and a lower element 25, which are connected.

In both elements 14 and 15 there are formed channel-shaped passages which, with the connection of the said elements, form what are substantially sections of piping located between said elements with variable development depending on whether the channel-shaped passage is formed in one or other of the elements, or partly in one and partly in the other.

The circuit according to the invention can form a large number of hydraulic connections, it being only necessary for provision to be made for them to have a development without intersections between different connection: this is brought about, as will be clear by providing an adequate reciprocal disposition of the hydraulic components to be interconnected and also inlet and outlet mouths of the external circuits connected to this circuit of interconnections.

The example herein described indicates one of the possible ways of disposing the interconnections, solely by way of example, so as more clearly to illustrate the utility of the invention.

The numeral 20 indicates the outlet for the primary heat-exchanger and the numeral 21 indicates the relative return.

The numeral 22 indicates the outlet to the heating system and 23 the relative return.

The numeral 24 indicates the inlet for the cold water for sanitary use and 25 the outlet for such water, after heating.

A conventional accelerator per se known can be fixed to the circuit 13 in the position indicated by 26, with its delivery at 27, connected by the passage 28 to the outlet mouth 20.

Accelerator suction is at 29, connected by the pipe 30 to one of the ways (at 31) of a conventional 3-way valve indicated overall by 32.

This valve deviates flow respectively in the direction of 33 (and thus to 23 through the passage 35) or to 36 to receive, through 37, the water coming from 38.

Indicated overall by 39 is a water-water heat exchange also of conventional type, in which the outlet of the heating water is at the mouth 38 and its inlet at the mouth 40 which is connected to 21 through 41.

The connections 22 and 21 are interlinked by the passage 34.

The water for sanitary use coming from 24 through the passage 42 debouches at 43 into the secondary heat-exchanger, leaving it heated at 44 and, through 45 and 25, is sent to the system.

Along the pipe 42, at 46, there can be mounted a flow sensor device, for piloting the 3-way valve by means of a hydraulic signal sent through the passage 47 according to a disposition well-known to persons with ordinary skill in the art.

This sensor device controls the 3-way valve and sends hot water to the secondary heat-exchanger mounted at 39 in relation to the demand for the water for sanitary uses that passes through the said exchanger.

The particularly advantageous configuration of the circuit according to the present invention makes it possible to mount other particulars also: thus there is shown a passage 48 on which there is mounted at 49 a full-pressure valve so as to form a by-pass for the heating system.

A relief valve, connected by 51 to the heating system return can be mounted at 50.

An accelerator head sensor can be mounted at 52, between suction and delivery to which it is connected by 53 and 54, and such sensor enables the supply to the burner only when the signal indicates and adequate flow or and adequate head.

On the circuit there can also be mounted a bleed 55 for circuit and accelerator, a connection 56 to an expansion tank, and also other components not shown in the foregoing description, all in the desired reciprocal positions, account being taken of the requirements of the structure of the boiler with which the circuit is associated.

In order to show the readiness with which the hydraulic components can be coupled to the circuit formed by the two plate-shaped elements in accordance with the invention, Figure 3 indicates by way of example the outlet 25 and the circuit area adjacent to it, and Figure 4 shows how at 49 the conventional by-pass valve can be mounted.

As this last-mentioned valve is per se well-known, it is not here illustrated in detail.

The other components, such as the accelerator, the secondary heat-exchanger, the other valves, etc., are mounted in an entirely comparable manner.

In addition to the hydraulic connections mouths, there can clearly also be formed in the circuit the means for fixing the components, for example seats for accepting the mounting screws.

The seats can consist of threaded bushes welded to or buried in one of the plate-shaped elements of the circuit.

One of the basic advantages of the invention is that it makes it possible to embody the plate-shaped elements constituting the circuit with a wide variety of materials, typically plastics material with characteristics suitable for resisting heat shock and mechanical stresses.

The fact that the structure proposed by the present invention allows the use of plastics material means that a radical solution can be given to the corrosion problems that always affect the circuits of boilers of the type in question, which in turn means that the construction, even if rapid and economical to realize, is highly dependable.

The two plate-shaped elements making up the circuit must be welded in the region of their interface, principally on the contour of all the hydraulic passages that are formed as a result of the coupling of the elements.

Whatever systems are best suited to the material used can be employed for such welding, and therefore both system employing heat and systems employing bonding agents and solvents can be adopted.

As the foregoing shows, the hydraulic connections according to the invention not only materializes the hydraulic connections but is also the bearing elements for at least some, but also many, of the hydraulic components of the boiler circuit, in this way simplifying the structure of the boiler itself and allowing the formation of a kind of pre-assembled hydraulic sub-unit, which is extremely useful and advantageous in constructing the boiler.

Especially if made from plastics material, the circuit can also have the connections to the components on it so that they form part of the latter.

As shown in Figure 4, for instance, the seat on which the plug of a valve operates can be directly formed in the housing in which the valve is mounted, thus simplifying the embodiment by reducing the overall dimensions of this latter.

As hitherto stated, the foregoing represents an illustrative and not limiting description of one form of embodiment of the invention, so that persons skilled in the art can readily introduce variants to obtain a circuit in accordance with the invention suited to the specific application involved.

Claims

1) Integrated hydraulic circuit for hot-water heating boiler and water for sanitary uses, forming a plurality of connections between hydraulic components of the boiler, among which at least an accelerator, a secondary water-water heat-exchanger and a 3-way valve for selectively deviating the flow of water from the accelerator to the said heat-exchanger or to a heating circuit, wherein the circuit is realized by the joining of two facing plate-shaped elements, channel-shaped passages being formed in at least one of them and the elements being joined in a watertight manner at their interface at least in the region of the peripheral passages, provision being made on the said circuit for the fixing of at least the accelerator, the secondary heat-exchanger and the 3-way valve, and provision also being made for inlet and outlet connections for a primary heat-exchanger, a heating system and a sanitary water system.

2) Hydraulic circuit as described in claim 1, wherein the said plate-shaped elements are formed by moulding of plastics material.

3) Hydraulic circuit as described in claim 1, wherein the said channel-shaped passages are formed by alternate drawings in the one and the other of the plate-shaped elements.

4) Hydraulic circuit as described in claim 1, wherein the plate-shaped element that accepts hydraulic components on its outer side features solidly with it protruding parts which cooperates with organs of the said components.

5) Hydraulic circuit as described in claim 2, wherein the inlet and outlet connections consist of fittings partly buried in the material constituting one of the plate-shaped elements.

6) Hydraulic circuit as described in claim 2, wherein the seats for fixing the hydraulic components comprise threaded bushes for accepting screws for retaining the said components against the relative plate-shaped element of the circuit.

7) Hydraulic circuit as described in one or more of the preceding claims, substantially as described above and illustrated in the appended drawings.

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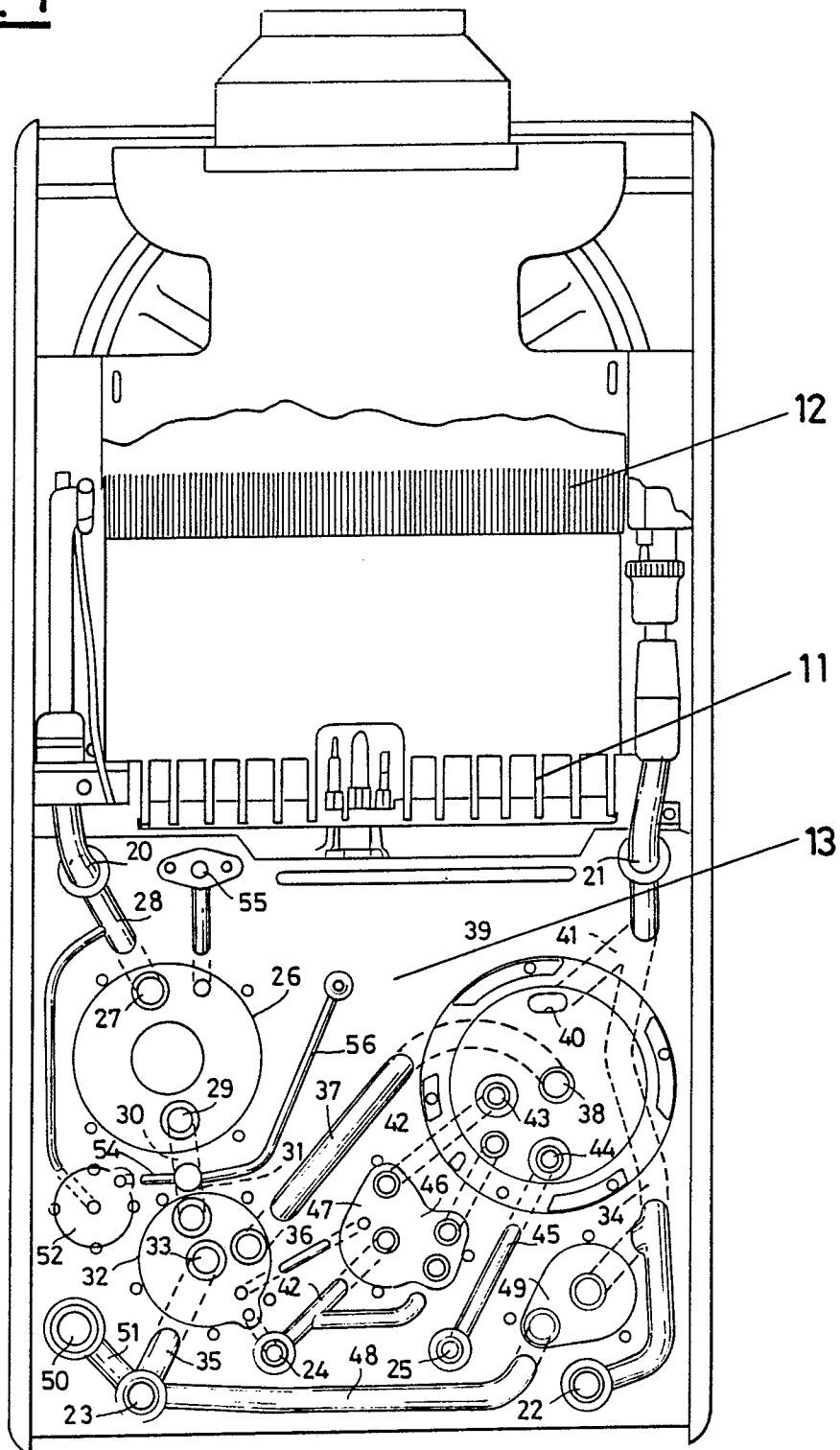
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Fig. 1

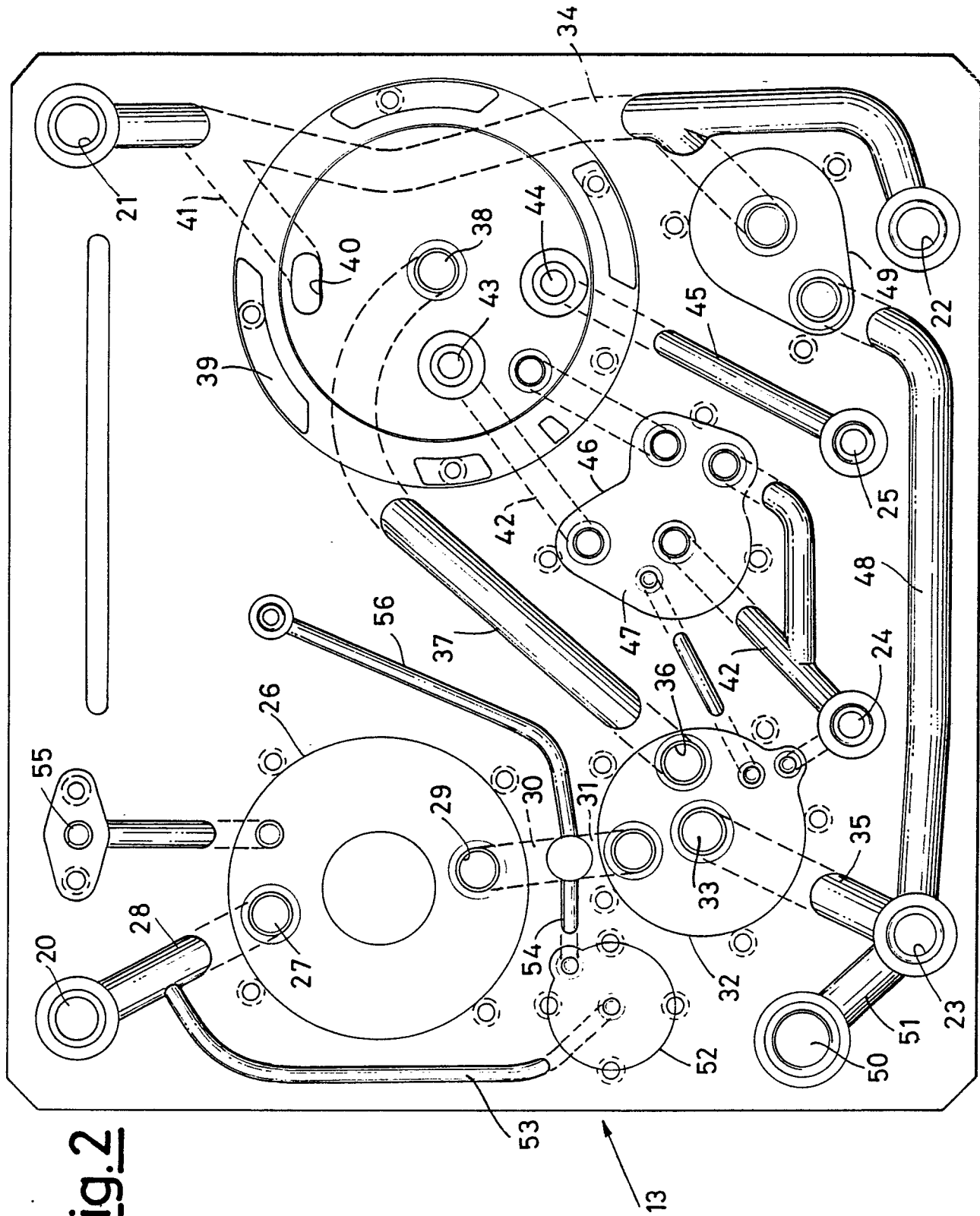
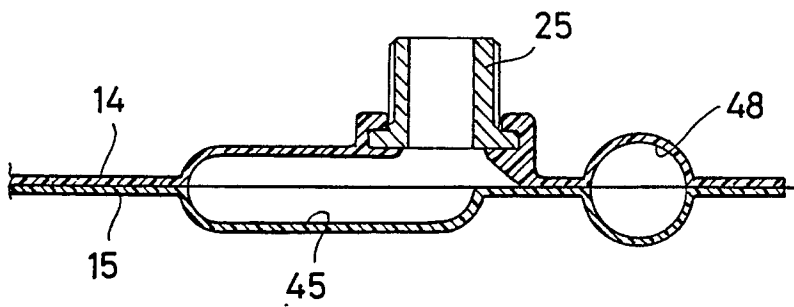


Fig.3Fig.4