

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number:

0 374 727
A1

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: 89123125.0

(51) Int. Cl.⁵: F24D 19/10

(22) Date of filing: 14.12.89

(30) Priority: 19.12.88 IT 1813788

(43) Date of publication of application:
27.06.90 Bulletin 90/26(84) Designated Contracting States:
AT BE DE ES FR GB IT NL

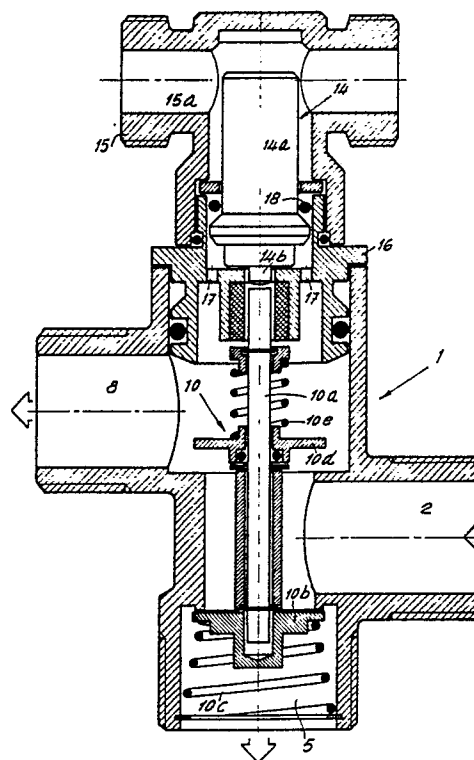
(71) Applicant: **RAGAZZI SANTE** doing business
under the trading style **THERMOMAT DI**
RAGAZZI P.I. SANTE
Via Puccini, 33
I-46030 Virgilio (Prov. of Mantova)(IT)

(72) Inventor: **RAGAZZI SANTE** doing business
under the trading style **THERMOMAT DI**
RAGAZZI P.I. SANTE
Via Puccini, 33
I-46030 Virgilio (Prov. of Mantova)(IT)

(74) Representative: **Modiano, Guido et al**
MODIANO, JOSIF, PISANTY & STAUB
Modiano & Associati Via Meravigli, 16
I-20123 Milano(IT)

(54) **Three-way valve for gas boiler.**

(57) The invention relates to a three-way valve for gas boiler, adapted to receive warm water produced by the burner (4) and comprising a shutter (10) adapted to selectively open the warm water outflow port (5) toward the heating circuit and the warm water outflow port (8) toward means which allow to transfer all the heat developed by the burner to the water of the sanitary circuit, the shutter (10) being actuated by a motor characterized in that it comprises a heat-sensitive element (14) which is adapted to axially expand as the temperature rises, acts on the shutter in contrast with elastic means (10R, 10C) and is inserted in a coupling associated with the valve and adapted to be flown by the sanitary-circuit cold water entering the boiler so as to be lapped at least by said cold water.



EP 0 374 727 A1

THREE-WAY VALVE FOR GAS BOILER

The invention relates to a three-way valve for gas boiler.

It is known that gas boilers for domestic use, intended for the combined production of warm water for the room-heating circuit and of warm water for sanitary uses, comprise a burner of such power as to satisfy exclusively the heat demand of only one of said circuits.

The operating layout of said boilers therefore comprises a three-way valve with one port for the inflow of warm water produced by the burner and two outflow ports: the first outflow port sends the warm water to the heating circuit, whereas the second one sends the warm water to means which allow to transfer all the heat developed by the burner to the water of the sanitary circuit and which can be constituted for example by a bypass, when a coil for the heating-circuit water and a coil for the sanitary-circuit water are provided in front of the burner, or by a heat exchanger in which the water of the sanitary circuit receives heat from the water heated by the burner.

The operation of the three-way valve is automatic and is caused by a motor which acts on a shutter when cold water starts to arrive from the sanitary circuit; said shutter closes the outflow port of the warm water toward the heating circuit and simultaneously opens the other port to allow all the heat produced by the burner to be transferred to the water of the sanitary circuit; said motor acts again on the shutter so as to open the port which leads to the heating circuit, simultaneously closing the other port, when the flow of sanitary-circuit cold water ends.

The shutter actuation motor of known three-way valves comprises means, such as for example an elastic membrane or an electric motor, which receive the signal to start operation from a detected value constituted by the differential pressure which occurs between the upstream and downstream portions of a throttled portion provided on the sanitary circuit when water is present therein and obviously ceases when the inflow of water therein ceases.

Motors which use this operating principle, however, are complicated, scarcely reliable and excessively expensive, and therefore the aim of the present invention is to provide a three-way valve for gas boiler in which the shutter actuation motor has an extremely simple configuration with a consequent reduction in costs and with safety in operation.

The proposed aim is achieved by a three-way valve for gas boiler, according to the invention, adapted to receive warm water produced by the

burner of the boiler and comprising a shutter adapted to selectively open the warm water outflow port toward the heating circuit and the warm water outflow port toward means which allow to transfer all the heat developed by the burner to the water of the sanitary circuit, said shutter being actuated by a motor adapted to automatically start operation upon every inflow of cold water of the sanitary circuit into the boiler so as to move said shutter to the closed position of the warm water outflow port toward the heating circuit, with return to the open position of said port when the inflow of sanitary-circuit cold water ceases, characterized in that the shutter actuation motor comprises a heat-sensitive element adapted to axially expand when the temperature of its walls rises, said element acting on the shutter in contrast with elastic means and being inserted in a coupling associated with the valve and adapted to be flown by the sanitary-circuit cold water entering the boiler, so as to be lapped at least by said cold water.

Further characteristics and advantages will become apparent from the description of a preferred but not exclusive embodiment of the invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a sectional view of the invention with the shutter in the shut-off position of the sanitary-water outflow port toward the heating circuit;

figure 2 is an operating diagram of the gas boiler comprising the valve according to the invention.

With reference to the above figures, 1 generally indicates the three-way valve; 2 indicates the inflow port for the warm water produced in the coil 3 by the burner 4, and 5 indicates the outflow port for the warm water toward the heating circuit, which comprises elements such as 6 and a circulation pump 7; 8 indicates the outflow port for the warm water through the bypass 9.

The shutter, generally indicated at 10, operates in the body of the valve 1 and is adapted to selectively open the outflow ports 5 and 8; said shutter comprises the supporting stem 10a for the plate 10b closing the port 5, which plate operates in contrast with the spring 10c and the plate 10d which operates in contrast with the spring 10e for closing the port 8.

When the shutter is in the position illustrated in figure 1, which must occur when cold water enters the sanitary circuit, the warm water produced in the coil 3 by the burner 4 enters the valve 1 through the port 2 and exits through the port 8 to enter the bypass 9 so as to immediately return, without dis-

sipating heat, to the coil 3 which therefore requires no addition of heat; all the heat produced by the boiler 4 thus transfers to the coil 11 of the sanitary circuit, in which cold water enters from 12 and heated water exits from 13.

Vice versa, when the shutter is in the position in which the plate 10d is in contact with its sealing seat, i.e. in the condition which must occur when no cold water enters the sanitary circuit, the warm water produced in the coil 3 and arriving at the valve 1 flows through the port 5 to the heating circuit which comprises the radiating elements 6, and in this case all the heat produced by the burner 4 transfers to the water of the heating circuit.

The motor which automatically actuates the shutter 10 between the two above described extreme positions at every beginning and end of cold water inflow to the sanitary circuit comprises, according to a salient characteristic of the invention, the heat-sensitive element 14, of a per se known kind, which is adapted to axially dilate when the temperature of its walls rises, since it comprises a container 14a of a substance which, indeed by dilating when the temperature of the wall rises, causes the extraction of the rod 14b.

Said heat-sensitive element 14 is inserted, so as to directly contact, by means of the rod 14b, the upper end of the stem 10a of the shutter 10, within the connection 15, which comprises the duct 15a for conveying all the cold water of the sanitary circuit entering from 12 and is associated, with the plug 16 interposed, with the body of the valve 1; ports such as 17, provided in the plug 16, allow the flow of warm water to lap a lower wall portion of the heat-sensitive element 14 which is separated, by means of the gasket 18, from the upper portion which is intended to be lapped by the cold water of the sanitary circuit.

The operation of the motor according to the invention is evident: the condition of figure 1, in which the outflow port 5 toward the heating circuit is closed, with transfer of all the heat generated by the burner to the water of the sanitary circuit, occurs when cold water of the sanitary circuit indeed circulates in the duct 15a of the connection 15; said water, lapping the heat-sensitive element 14, cools its wall, with a consequent minimum protrusion of the rod 14b, allowing the spring 10c to push the plate 10b against its sealing seat.

When the inflow of cold water of the sanitary circuit ends, the cooling action on the heat-sensitive element 14 also ends; said element consequently heats increasingly, both because it is inserted within a metallic mass such as the one constituted by the body of the valve 1, by the plug 16 and by the coupling 15, which is heated by the flow of warm water arriving from the coil 3, and

because it is lapped, in the lower region, by the part of said warm water which enters the ports 17.

The progressive heating of the element 14 causes the progressive protrusion of the rod 14b which, overcoming the action of the spring 10c, lowers the shutter 10 until the plate 10d is in contact with its own sealing seat; an extra-stroke of the rod 14b being allowed by the presence of the spring 10e; the condition thus reached causes the inflow of warm water exclusively through the outflow port 5 to the heating circuit, and this condition persists until a new inflow of cold water into the sanitary circuit occurs, with a consequent cooling of the heat-sensitive element 14 and retraction of the rod 14b in the position of figure 1.

From the above it is clear that the invention provides an extremely simple device which ensures a very delicate actuation of the shutter such as is required to avoid thermal shocks in the boiler caused by sudden temperature variations.

The described invention is susceptible to numerous modifications and variations, all of which are within the scope of the inventive concept; all the details may furthermore be replaced with other technically equivalent elements.

In the practical execution of the invention, the materials employed, as well as the shapes and dimensions, may be any according to the requirements.

Where technical features mentioned in the claims are followed by reference numerals and/or signs, those reference numerals and/or signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference numerals and/or signs do not have any limiting effect on the scope of each element identified by way of example by such reference numerals and/or signs.

Claims

1. A three-way valve for gas boiler, adapted to receive warm water produced by the burner of the boiler and comprising a shutter adapted to selectively open the warm water outflow port toward the heating circuit and the warm water outflow port toward means which allow the transfer of all the heat developed by the burner to the water of the sanitary circuit, said shutter being actuated by a motor adapted to automatically start operation automatically every time cold water of the sanitary circuit enters the boiler so as to move said shutter to the closed position of the warm water outflow port toward the heating circuit, with return to the open position of said port when the inflow of sanitary-circuit cold water ends, characterized in that the shutter actuation motor comprises a heat-

sensitive element adapted to expand axially when the temperature of its walls rises, said element operating on the shutter in contrast with elastic means and being inserted in a coupling associated with the valve and adapted to be flown by the sanitary-circuit cold water entering the boiler, so as to be lapped at least by said cold water.

5

2. A valve according to claim 1, characterized in that said heat-sensitive element is arranged coaxially to said shutter so as to directly contact an end of the shutter which is in contact, at the other end, with a contrast spring.

10

3. A valve according to one or more of the preceding claims, characterized by the presence of ports for the passage of warm water so as to lap a portion of walls of the heat-sensitive element which is separated by means of a sealing gasket from a portion intended to be lapped by the cold water of the sanitary circuit.

15

20

25

30

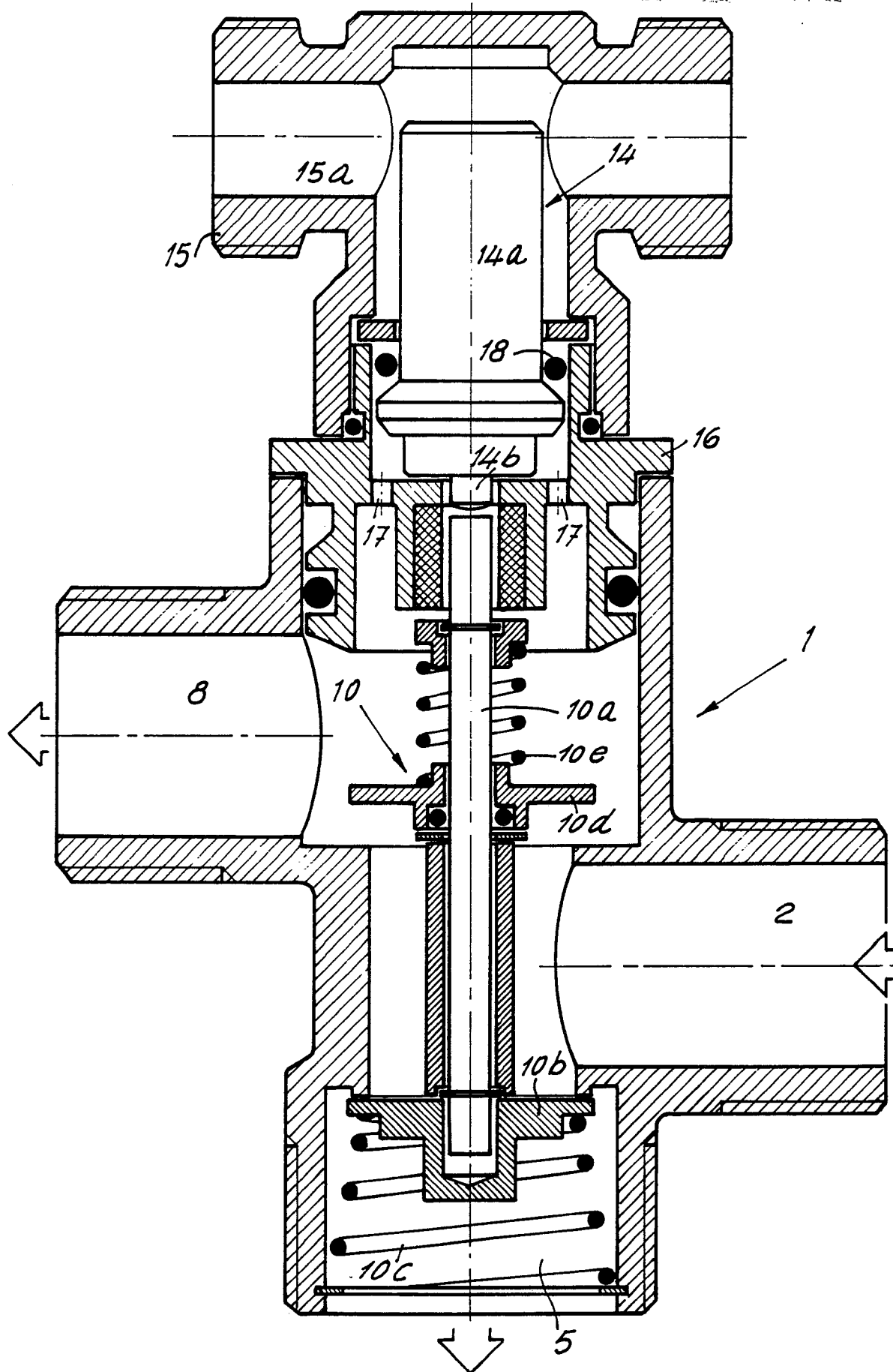
35

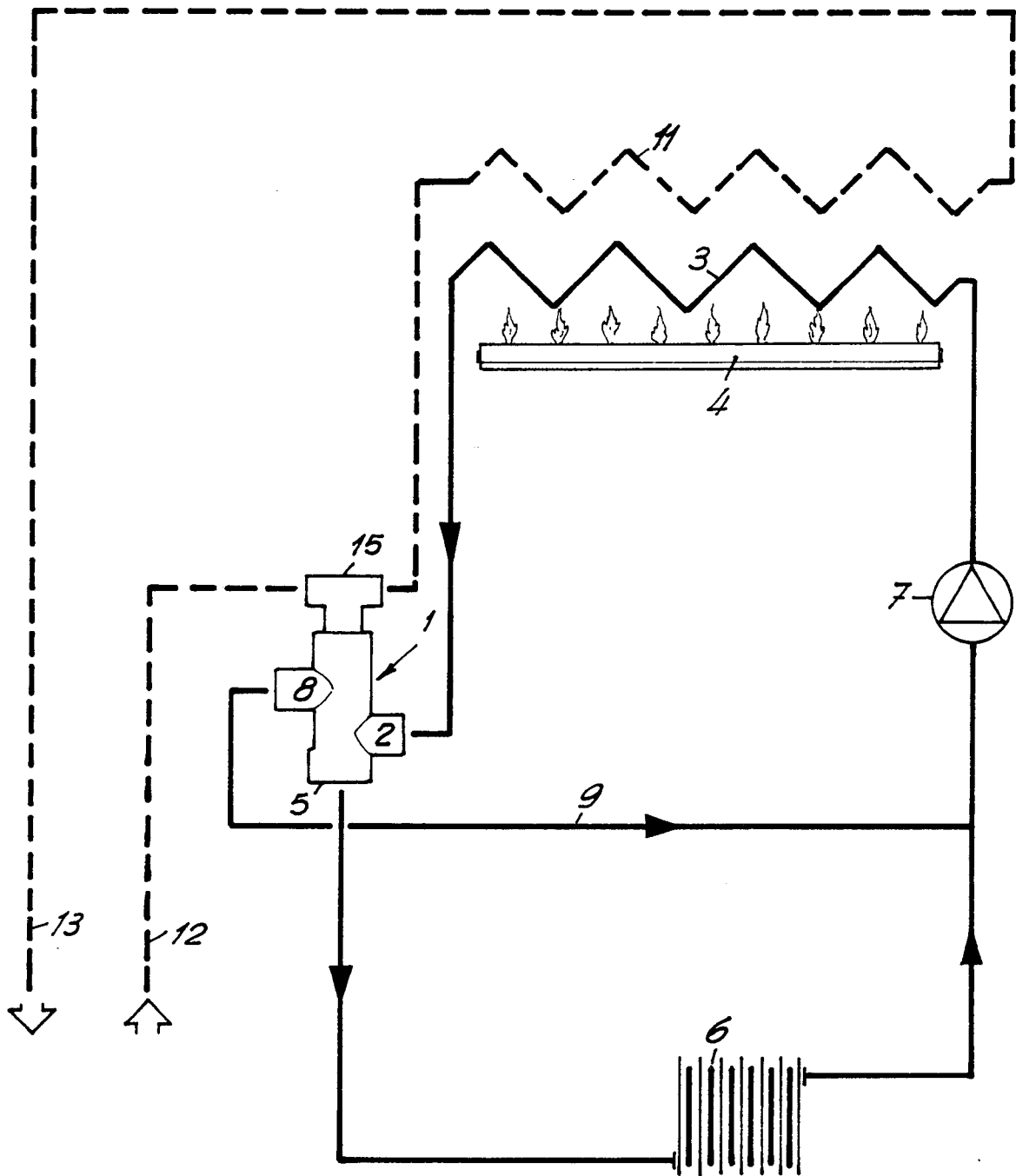
40

45

50

55







DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	DE-A-2 034 636 (J. VAILLANT KG) * The whole document * ---	1-3	F 24 D 19/10
X	DE-B-2 119 622 (J. VAILLANT KG) * The whole document * ---	1-3	
A	FR-A-1 388 943 (GENERAL THERMIQUE) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			F 24 D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 27-02-1990	Examiner VAN GESTEL H.M.
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			