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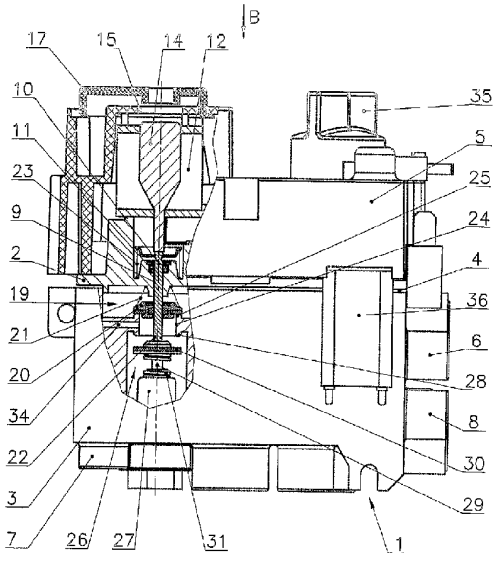
(54) Title: GAS REGULATING FITTING

(54) Bezeichnung: GASREGELARMATUR



(57) Abstract: The aim of the invention is to create a gas regulating fitting that, in addition to enabling an electronic ignition of the gas flow, also permits a manual ignition. An unwanted manual actuation should, however, be prevented. A covering element (17) is displaceably mounted on the housing (1) of the gas regulating fitting and, in a first position, covers a tappet (10; 14), which is provided for actuating a thermoelectric ignition safety valve (26) and a main valve (19), and covers a control switch (13) of a piezoelectric igniting element. When the covering element (17) is in a second position, an actuation of the tappet (10; 14), which inevitably occurs when the covering element (17) is displaced, ensures that the main valve (19) is located in the closed position. In addition, the control switch (13) and the tappet (10, 14) are released in this position in such a manner that an ignition of the gas flow is made possible by a manual actuation thereof. The gas regulating fitting can be used for igniting and for controlling a gas flow flowing to a burner.

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PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

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— *vor Ablauf der für Änderungen der Ansprüche geltenden Frist; Veröffentlichung wird wiederholt, falls Änderungen eintreffen*

Zur Erklärung der Zweibuchstaben-Codes und der anderen Abkürzungen wird auf die Erklärungen ("Guidance Notes on Codes and Abbreviations") am Anfang jeder regulären Ausgabe der PCT-Gazette verwiesen.

(57) **Zusammenfassung:** Es soll eine Gasregelarmatur geschaffen werden, die neben einer elektronischen Zündung des Gasstromes auch eine manuelle Zündung ermöglicht. Eine ungewollte manuelle Betätigung soll jedoch verhindert werden. Auf dem Gehäuse (1) der Gasregelarmatur ist ein Abdeckelement (17) beweglich gelagert, das in einer ersten Stellung einen zur Betätigung eines thermoelektrischen Zündsicherungsventils (26) und eines Hauptventils (19) dienenden Stößel (10; 14) und einen Taster (13) eines piezoelektrischen Zündelementes abdeckt. In einer zweiten Stellung des Abdeckelementes (17) wird über eine bei der Verstellung des Abdeckelementes (17) zwangsweise stattfindenden Betätigung des Stößels (10; 14) sichergestellt, dass sich das Hauptventil (19) in Geschlossenstellung befindet. Weiterhin sind in dieser Stellung der Taster (13) und der Stößel (10; 14) derart freigegeben, dass über eine manuelle Betätigung derselben ein Zünden des Gasstromes ermöglicht wird. Die Gasregelarmatur kann zur Zündung und zur Regelung eines einem Brenner zufließenden Gasstromes benutzt werden.

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GAS REGULATING FITTING

Field of the Invention

The invention concerns a gas regulating fitting with electronic ignition; in particular for a gas heating stove.

Background of the Invention

Gas regulating fittings for a gas heating stove and the like are available in a large number of designs. They serve to ignite and regulate a stream of gas flowing into a burner. As the installation location for an adjustment is often unsuitable, there are now solutions in which electronics are used.

DE patent application document 103 05 929.6 describes a process and an arrangement for igniting a gas stream. Here, in order to ignite a gas stream, an ignition locking magnet is triggered via an electronic control unit by generating a holding current supplied from an electricity source to keep open a thermoelectric ignition locking valve blocking off the gas stream. As soon as the ignition locking magnet is energised, an electromagnet is briefly energised by a voltage pulse, so that an actuating strut aligned with the ignition locking valve can be moved so far in a longitudinal direction against the force of a restoring spring that the ignition locking valve, the valve disc of which is supported on a valve rod and loaded in the direction of closure by a restoring spring, opens and positions the anchor of the ignition locking magnet, which is firmly connected to the valve rod. The anchor is restrained by a holding current coming from the electricity source until he gas stream is ignited and a thermocouple provides the necessary holding current. For this purpose, the winding of the ignition locking magnet is incorporated into the circuit of a thermocouple that can be heated by the pilot light and on the other hand can be controlled by the electronic control unit.

In this respect it is a disadvantage that if there is a breakdown of the electricity source, such as for example empty batteries or a fault, although it may be possible to continue running the gas heating stove, it is no longer possible to re-ignite the gas stream after switching off and so starting the gas heating stove is no longer possible either.

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Another design of a gas ignition device for controlling the ignition of a gas burner electricity is familiar from patent document GB 2.295.220 A. Here, a magnet coil is connected by a switch to a mains voltage source. Energising the magnet coil opens a gas valve via an actuator, so that the gas can flow to the burner where it is ignited electrically. After a fixed period of time has elapsed, the magnet coil will be disconnected from the electrical supply system and the actuator will return to its initial position. The function of maintaining the gas valve open is taken over by a magnet unit, which is supplied with current by a thermocouple subject to the influence of a burning gas flame.

In order to prevent the gas valve closing if the electricity supply drops out while the gas burner is in operation, the gas ignition device can be equipped with an additional battery, which can maintain operation to a limited extend, or the actuator can be operated manually for the same reason to open the gas valve.

With this design, it is not possible to ignite the gas burner if the electricity supply drops out either. It is also a disadvantage that protection from unwanted manual operation of the actuator, as provided for to maintain the gas stream to the gas burner in case of a breakdown, does not exist.

Summary of the Invention

In light of the above described prior art, it would be desirable to facilitate manual ignition of the gas stream in gas regulating fittings with electronic ignition whilst otherwise preventing unwanted manual operation. Apart from this and irrespective of the nature of the ignition, it would also be advantageous to guarantee that the main gas stream to the burner is interrupted, in particular during ignition. Furthermore, the gas regulating fitting should have as simple a design as possible.

In a first aspect, the present invention provides a gas regulating fitting with electronic ignition for gas-heated stove appliances, including: a thermoelectric ignition locking (i.e. safety) valve and a main valve, which jointly serve both to provide a pilot light function and to split gas flow into components for a main burner and an ignition burner; a segmented housing in which are accommodated the locking and main valves with other secondary functional elements; a tappet located axially to the ignition locking valve and the main valve and which projects

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from a gas-bearing chamber of the housing, the tappet being arranged for longitudinal actuation against the force of a restoring spring via an electromagnet; and a covering element arranged and located on the housing in movable manner between an initial position, in which it obstructs access to and covers the tappet and a pushbutton of a piezoelectric ignition element, and a second position, in which the main valve is in the closed position and the pushbutton and the tappet are accessible so that the gas stream can be ignited by manual operation of these elements.

It is advantageous to locate the cover element (in the following also referred to as a 'masking element') on the housing in such a manner that in the initial position it covers both the push button or key which serves to activate the thermoelectric ignition locking (i.e. safety) valve and the tappet which serves to operate the thermoelectric ignition safety (or locking) valve and the main valve, whereby the tappet is disposed to protrude from the gas bearing chamber of the fitting and be activated in an axial direction by an electromagnet against a biasing return spring. The arrangement of the tappet, main valve and cover element and their interaction is such that when the cover element is in the second position, an actuator of the tappet, which inevitably occurs when the covering element is displaced into the second position, ensures that the main valve is in its closed state or position. Furthermore in the second position, the ignition key and the tappet are released in this position in such a manner that an ignition of the gas flow is made possible by a manual actuation thereof.

One characteristic of the invention can be seen in that the covering element, in its first position certainly prevents any undesired manual operation which could lead to igniting the gas stream. Nevertheless, if needed, such as in case of a power failure, it is simple to ignite the ignition gas flow manually. Irrespective of how ignition occurs, the main gas flow to the burner is guaranteed to the interrupted on ignition. In this the solution is distinguished by its simple design and simple manner of operation.

An advantageous embodiment of the gas regulating fitting provides for the masking element to have a link track, the pitch of which is fixed so that in the second position the main valve is in the closed position. For handling it is useful

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for the link track to also have notches designating the first and second positions on the masking element.

An especially simple embodiment has the masking element formed as a disc-shaped element that is located centrally and free to rotate on a pin. The masking element has clearances or cut-outs located such that when in the second position, access is enabled to the pushbutton and the tappet otherwise covered in the first position.

For manufacturing reasons in particular it is advantageous to provide a tappet design in which it is a multi-piece assembly.

Further (optional) features and advantages of the invention will become apparent from the following detailed description of a preferred embodiment with reference to the accompanying drawings. These are as follows:

Brief Description of the Drawings

Fig. 1 shows a side elevation view, partially in section, of a gas regulating fitting in accordance with the invention, in the closed position in the "electronic ignition" setting,

Fig. 2 shows a side elevation view, partially in section, of the gas regulating fitting of fig. 1 in the "manual ignition" setting,

Fig. 3 shows a side elevation view, partially in section, of the gas regulating fitting of Fig. 1 in the open position,

Fig. 4 shows a top plan view of the gas regulating fitting of Fig. 1 in the closed position in the electronic ignition setting; and

Fig. 5 shows a top plan view of the gas regulating fitting of Fig. 2 in the manual ignition setting.

Detailed Description of Preferred Embodiment

The gas regulating fitting in accordance with the invention exemplified in Fig. 1 is a switching and regulatory device that is preferably intended for installation in a gas-heated chimney stove or similar. It facilitates the operation and monitoring of a burner where the gas volume flowing to the burner is controlled. The burner consists in this embodiment of an ignition burner (now shown) and a main burner (also not shown).

This gas regulating valve consists of a housing 1, containing various functional units, which can be partially activated from outside using operating controls. The housing is made up of an upper part 2 and a lower part 3, between which a gasket 4 ensures leakpfroof closure from the outside, and a masking hood 5. In addition to this the housing consists of a gas input 6, a gas output 7, and a main gas output 4.

The gas regulating valve described in this embodiment has the following functional units:

- start-up with safety pilot
- control unit for the gas volume flowing to the main burner
- piezoelectric ignition element

It is triggered by any electronic control unit (not shown), which is in a separately located housing of a remote control together with an electricity source.

For start-up an actuating strut 10, the end of which extends into the inside of the housing, which can be operated by remote control 6 via an electromagnet 11 placed on housing 1, is fed so as to be movable lengthwise in a bearing 9 of housing 1, with the necessary gastightness being provided by O-rings 11 for example. An electromagnet 12 that can be actuated via the remote control is attached between the upper part 2 and the masking hood 5. There is also a piezoelectric ignition element in this chamber that can be activated manually via a pushbutton 13 extending from the masking hood 5.

Electromagnet 12 has a core 14 axially movable to the actuating strut 10, which together with the actuating strut 10 forms a tappet 10/14. The reason for splitting the tappet 10/14 is the resultant simplification in terms of installation, The face of the core 14 turned away from the housing 1 is visible through a recess 15 in the masking hood 5.

On a pin 16 in the masking hood 5 a disc-shaped masking element 17 is located so as to be free to rotate, with a link track 18 acting on the core 14. In an initial notch position (Fig. 4) the masking element 17 closes the pushbutton 13 and the recess 15, whereupon in a second notch position (Fig. 5) resulting from the rotation the pushbutton 13 and the core 14 of the electromagnet 12 are freely accessible through clearances 32/33 in the masking element 17.

On the area of the actuating strut 10 projecting into the interior of the upper portion 2 a valve disc 20 belonging to a main valve 19 is passed through so as to be movable, and is supported on a limit stop 22 formed on a lock washer mounted on a slot for example, located on the actuating strut 10, which, subject to the force of a recoil spring 21, bears on the one hand against upper part 2 and on the other against valve disc 20. Movement of the actuating strut 10 in a longitudinal direction is only possible against the force of a restoring spring 23 supported in housing 1. The starting position to be adopted under the force of restoring spring 23 is reached by the valve disc 20 of the main valve19 bearing against upper part 2.

The interior of the part of the housing formed by upper part 2 and lower part 3 is divided into different compartments by a partition 24. In alignment with and as an extension to the actuating strut 10 the partition 24 has an aperture, of which the side turned towards the upper part 2 forms the valve seat 25 for the valve disc 20, and so in connection with this forms the main valve 19, whereas the other side forms a valve seat 28 forming part of an ignition locking valve. Between both valve seats 25/28 an ignition gas borehole leading to ignition gas output 7 discharges into the aperture. The ignition locking valve 26 is influenced by a thermoelectric ignition locking magnet 27 downstream from gas input 6 placed gas-tight in a bearing of housing 1. The thermoelectric ignition locking magnet 27 acts on an anchor 19, which is rigidly linked to a valve stem 29, on which the valve disc 30 of ignition locking valve 26 is fastened. The thermoelectric ignition locking magnet 27 can be energised via the electronic control unit and via a thermocouple exposed to the pilot light..

The design and operation of ignition locking magnet 27 are otherwise familiar to specialists so that it is unnecessary to describe further details. It only needs to be emphasised that a restoring spring 31 endeavours to withdraw the anchor from the ignition locking magnet 27 via the valve disc 30 serving as a spring hanger.

In the direction of flow behind the start up there is a switch inside the housing 1, which controls the volume of gas flowing to the main burner. The switch is designed so that a modulating control via an initial valve 32 with a stepwise on and off switch in the part-load area is effected via a second valve. The part-load throughput is limited by an adjustable jet. A tappet lengthwise movable and frictionally connected with the switch projects from the housing 1, which at the same time forms a bearing for it. The necessary external gastightness is ensured by an O-ring for example. The end of the tappet turned away from the switch is connected to an operating element 35. The external circumference of operating element 35 has some toothing with which a pinion forming part of a step-up gear engages. The step-up gear is coupled to a drive unit 36 fastened to housing 1, consisting of an electric motor. To avoid overloading the motor, a slip clutch, familiar to specialists and not therefore explained in any further detail, is located between the drive unit 36 and the operating element 35. The drive unit 36 is triggered by remote control 6 via the electronic control unit.

With a normal function of the gas regulating valve the electronic control unit is activated via the remote control. This activates the electromagnet 12 by electric pulse so that the core 14 moves the actuating strut 10 in the direction of the ignition locking valve 26. First of all this closes the main valve 19 and then opens the ignition locking valve 26 wide enough for the anchor to bear against the ignition locking magnet 27 (Fig. 2). Apart from this the ignition locking magnet 27 is energised via the electronic control unit, so that from the time that the anchor strikes the ignition locking magnet 27, the anchor is held in this position by the flow of holding current, i.e. in the open position of ignition locking valve 27, while the actuating strut 10 re-adopts its starting position because

electromagnet 12 is de-energised after the pulse comes to an end and is subject to the effect of the restoring spring 23. The ignition gas can flow via the ignition gas borehole 34 to the ignition gas output 7 and from there via an ignition gas feed (not shown) to the ignition burner where it is ignited.

As soon as the pilot light is alight the drive unit 36 can be activated via the electronic control unit. This opens the switch in a familiar manner, resulting in an abrupt opening of the second valve. The constant volume of gas limited by an aperture flows over the main gas output 8 via a main gas feed (also not shown) to the main burner and is ignited by the pilot light. The flames burn at a minimal level. Further operation of drive unit 36 results in the volume of gas flowing to the main gas burner being uniformly increased as now the first valve continuously opens, achieving a uniform increase in the volume of gas flowing through the first valve until the maximum gas volume is reached.

If the electronic control unit breaks down, for example as a result of a power failure due to flat batteries, the masking element 17, which is normally in the first notch position assigned to the electronic ignition shown in Fig. 4 is rotated into the position displayed in Fig. 5. With this movement the link track 18 moves the core 14 far enough in a longitudinal direction for the actuating strut 10 to close the main valve 19. With the help of an ordinary household item manual force on the face of the core 14 now pushes the actuating strut 10 far enough in for the ignition locking valve 26 to open (Fig. 2). Maintaining the application of this force actuates the pushbutton 13 of the piezoelectric ignition device and ignites the ignition gas with the resultant spark.

After the thermocouple has been heated by the burning pilot light, so that the necessary holding current is available, the force applied to the core can be ended and the masking element 17 brought into the position shown in Fig. 4. Under the force of the restoring spring 23 the actuating strut 10 and the pushbutton 13 take up their initial position. The main valve 19 is opened and the ignition locking valve 26 is held in familiar fashion by the thermoelectric

ignition locking magnet 27 (Fig. 3). Manual operation of the operating element 35 via the switch now allows the volume of the gas flowing to the main burner to be regulated.

The process that is the subject of the invention and the arrangement for carrying out the process are not of course limited to the embodiment described. Alterations, adaptations and combinations are possible without departing from the scope of the invention. It is evident that the gas regulating valve for example can have further function units such as a pressure controller etc., apart from those mentioned.

List of reference marks

1	housing
2	upper part
3	lower part
4	gasket
5	masking hood
6	gas input
7	ignition gas output
8	main gas output
9	bearing
10	actuating strut
11	O-ring
12	electromagnet
13	pushbutton
14	core
15	recess
16	pin
17	masking element
18	link track
19	main valve
20	valve disc
21	recoil spring
22	limit stop
23	restoring spring
24	partition
25	valve seat
26	ignition locking valve
27	ignition locking magnet
28	valve seat
29	valve rod
30	valve disc
31	restoring spring
32	clearance
33	clearance
34	ignition gas borehole
35	operating element
36	drive unit

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Patent claims

1. Gas regulating fitting with electronic ignition for gas-heated stove appliances, including:

– a thermoelectric ignition locking valve and a main valve, which jointly serve the function of providing a pilot light function and splitting the gas flow into components for a main burner and an ignition burner;

– a segmented housing in which are accommodated the locking and main valves with other secondary functional elements of the fitting;

– a tappet located axially to the ignition locking valve and the main valve and which projects from a gas-bearing chamber of the housing, the tappet being arranged for longitudinal actuation against the force of a restoring spring via an electromagnet; and

– a cover element arranged and located on the housing in movable manner such that it can be displaced between an initial position, in which the cover element obstructs access to or covers the tappet and a pushbutton of a piezoelectric ignition element, and a second position in which the main valve is in the closed position and the pushbutton and the tappet are accessible so that the gas stream can be ignited by manual operation of these elements.

2. Gas regulating fitting in accordance with claim 1, wherein the cover element has a link track, the pitch of which is fixed so that in the second position the main valve is held in the closed position.

3. Gas regulating fitting in accordance with claim 2, wherein the link track has notches for both the first and the second position of the cover element.

4. Gas regulating fitting in accordance with any one of claims 1 to 3, wherein the cover element is disc-shaped and is located centrally so as to be free to rotate about a pin, the disc-shaped cover element having access clearances, which in the second position permit access for manual operation of the pushbutton and the tappet.

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5. Gas regulating fitting in accordance with any one of claims 1 to 4, wherein the tappet is of multi-piece construction.

6. Gas regulating fitting substantially as hereinbefore described with reference to the accompanying figures.

7. Gas-heated stove appliance having a gas regulating fitting in accordance with any one of claims 1 to 5.

8. Gas-heated stove appliance according to claim 7, wherein the appliance is a chimney stove.

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WATERMARK PATENT & TRADE MARK ATTORNEYS

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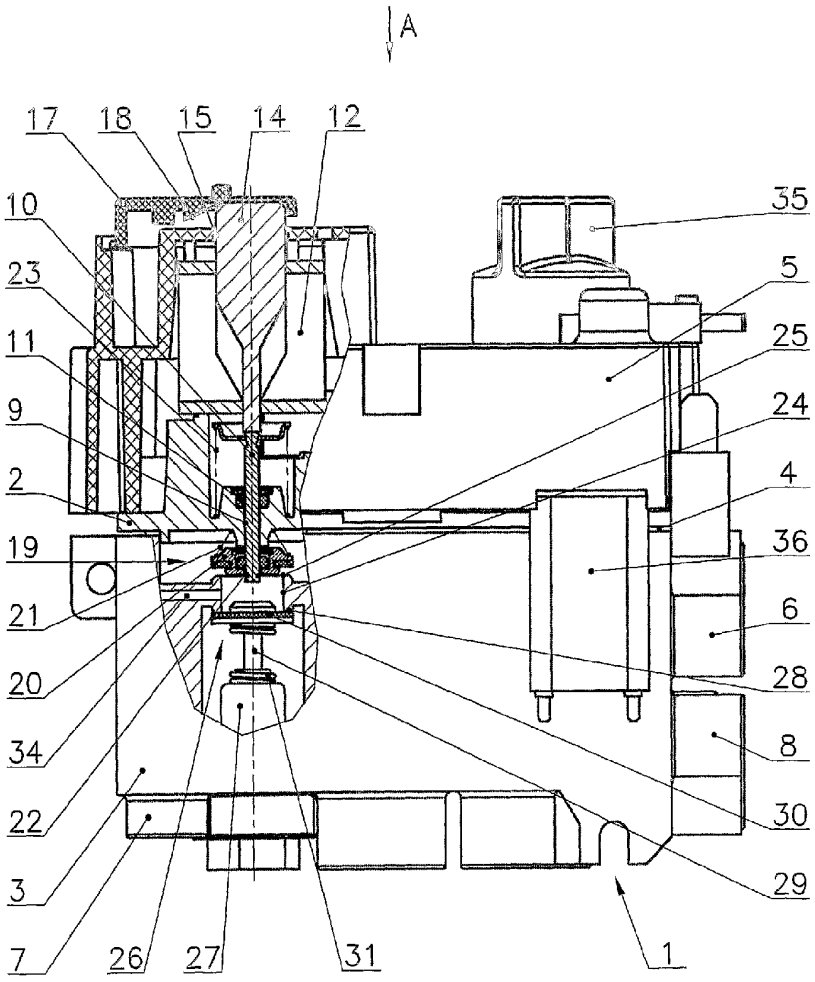
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Fig.1

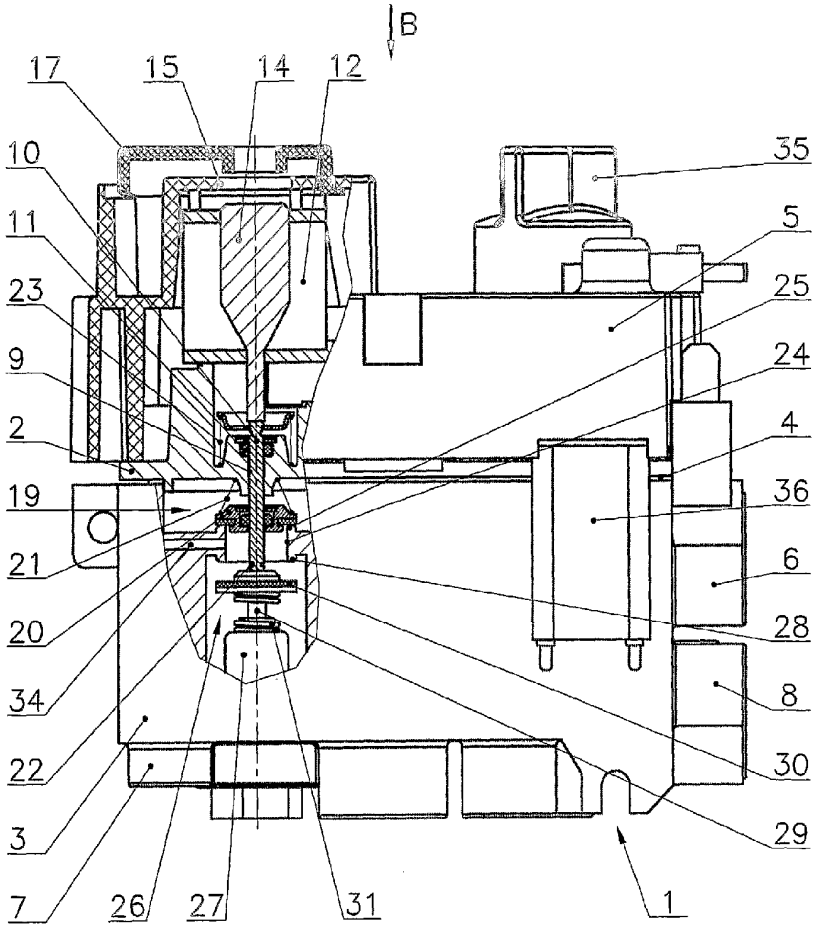
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Fig.2

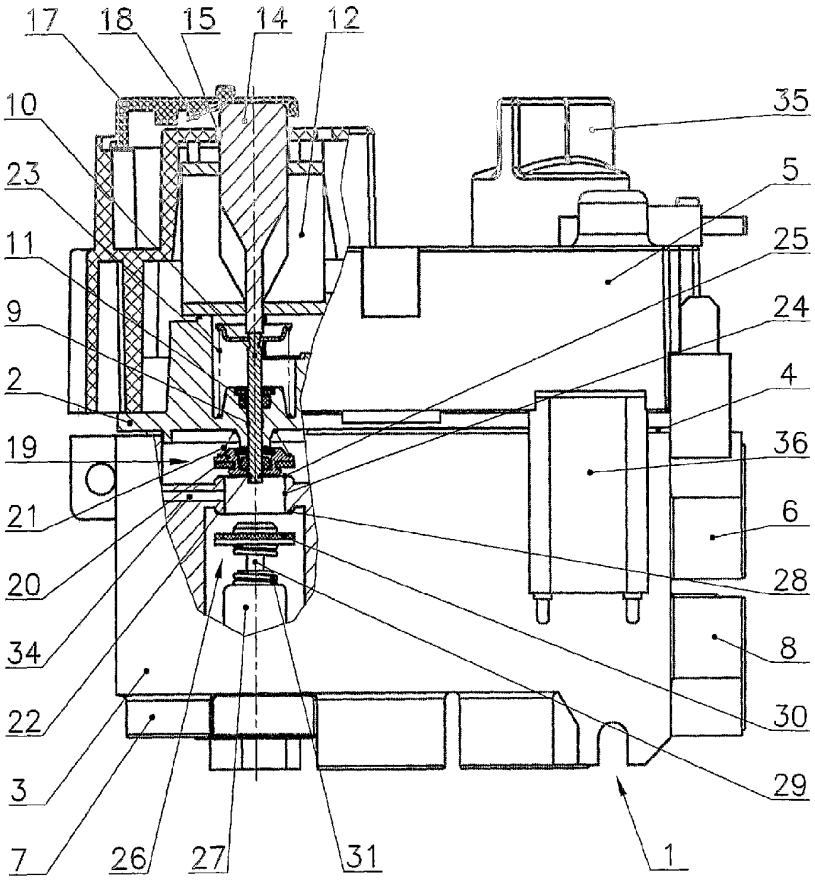
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Fig.3

Ansicht A

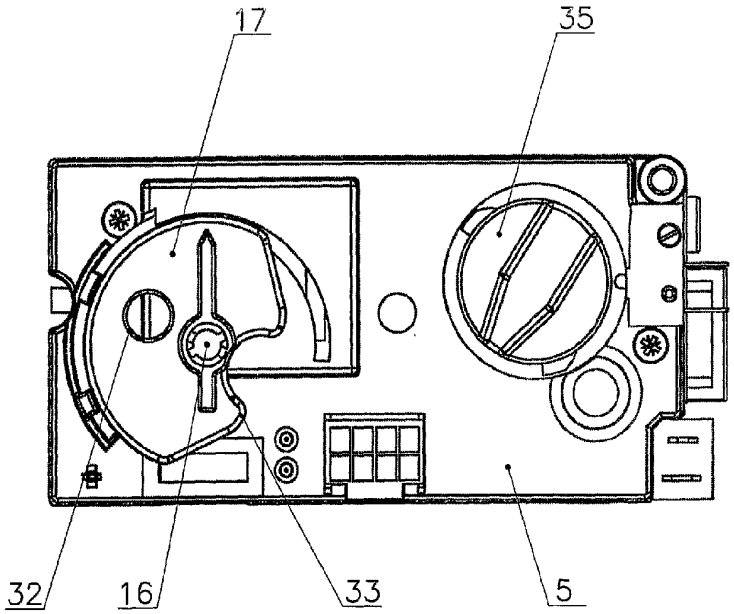

Fig.4

Ansicht B

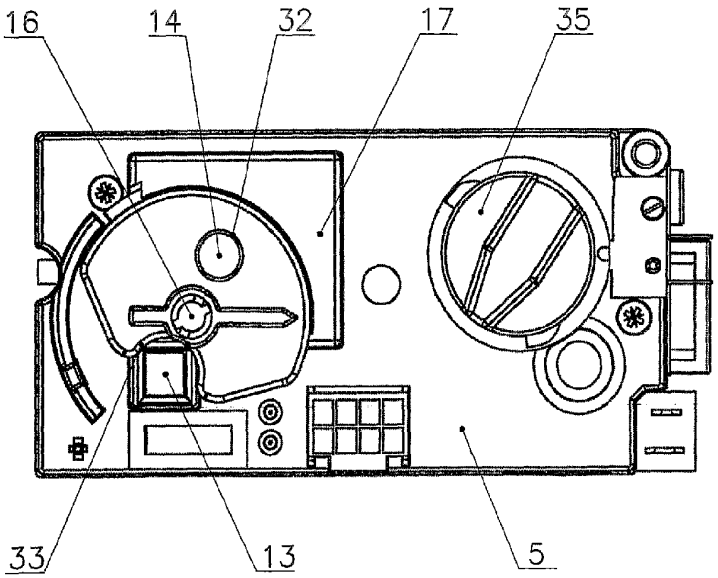

Fig.5