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F4T

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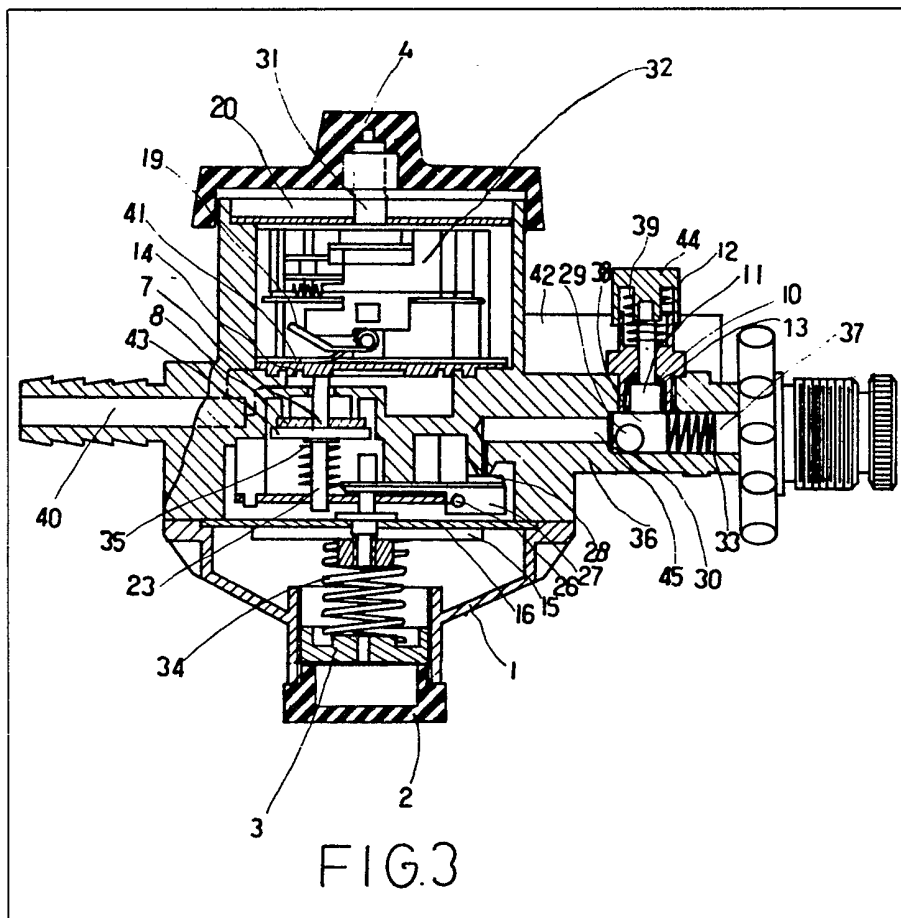
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(54) Gas regulator with safety and  
timing means

(57) The present invention relates to a gas regulator with safety and timing means, particularly to a gas regulator provided with a timer 31, a pressure-reducing regulator, and a safety valve 29 at the inlet side 37 of the main body portion of the gas regulator, by means of which, the gas flow rate can be controlled, the gas pressure can be reduced, the time allowed for the gas to pass through can be set, and the gas supply can be automatically cut off when excessive gas flow occurs. A pressure gauge 42 attached to the gas regulator can be used for detecting the degree of gas leakage.



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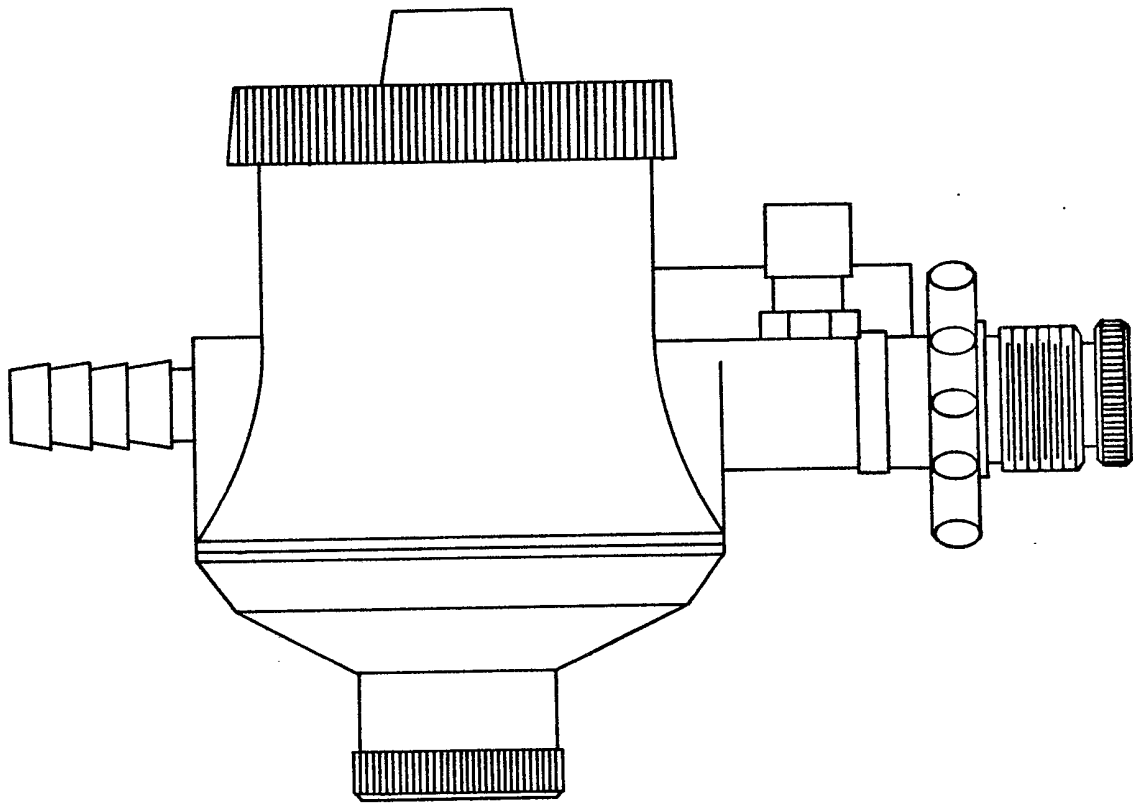


FIG. 1

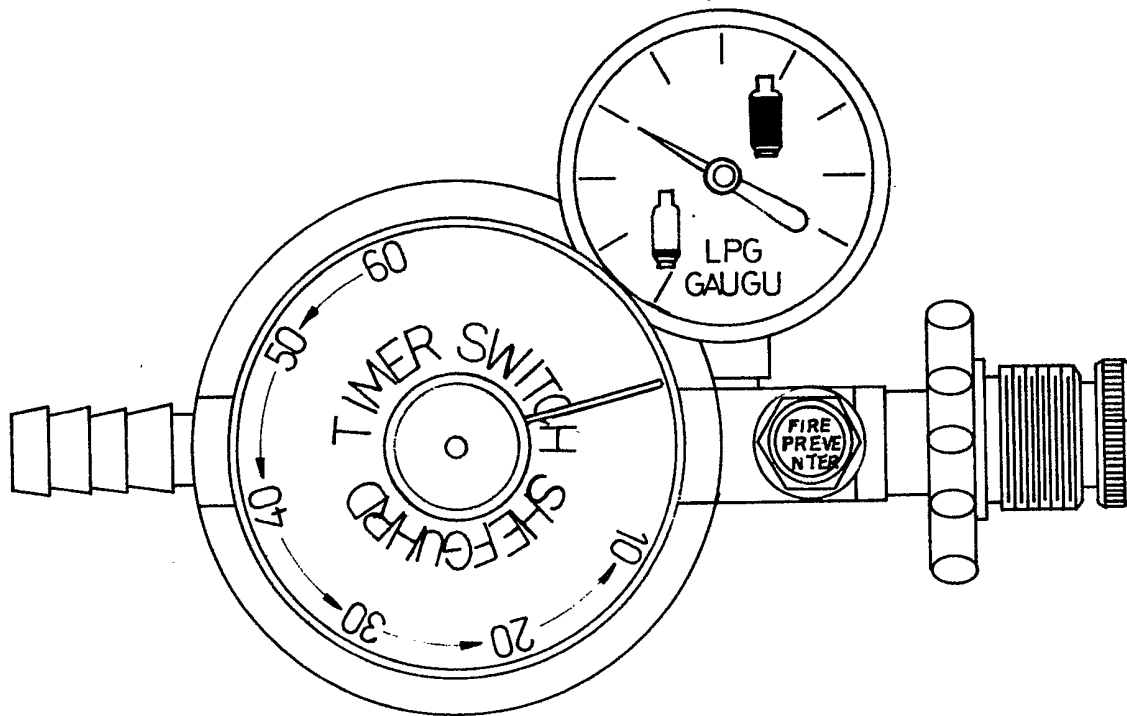


FIG. 2

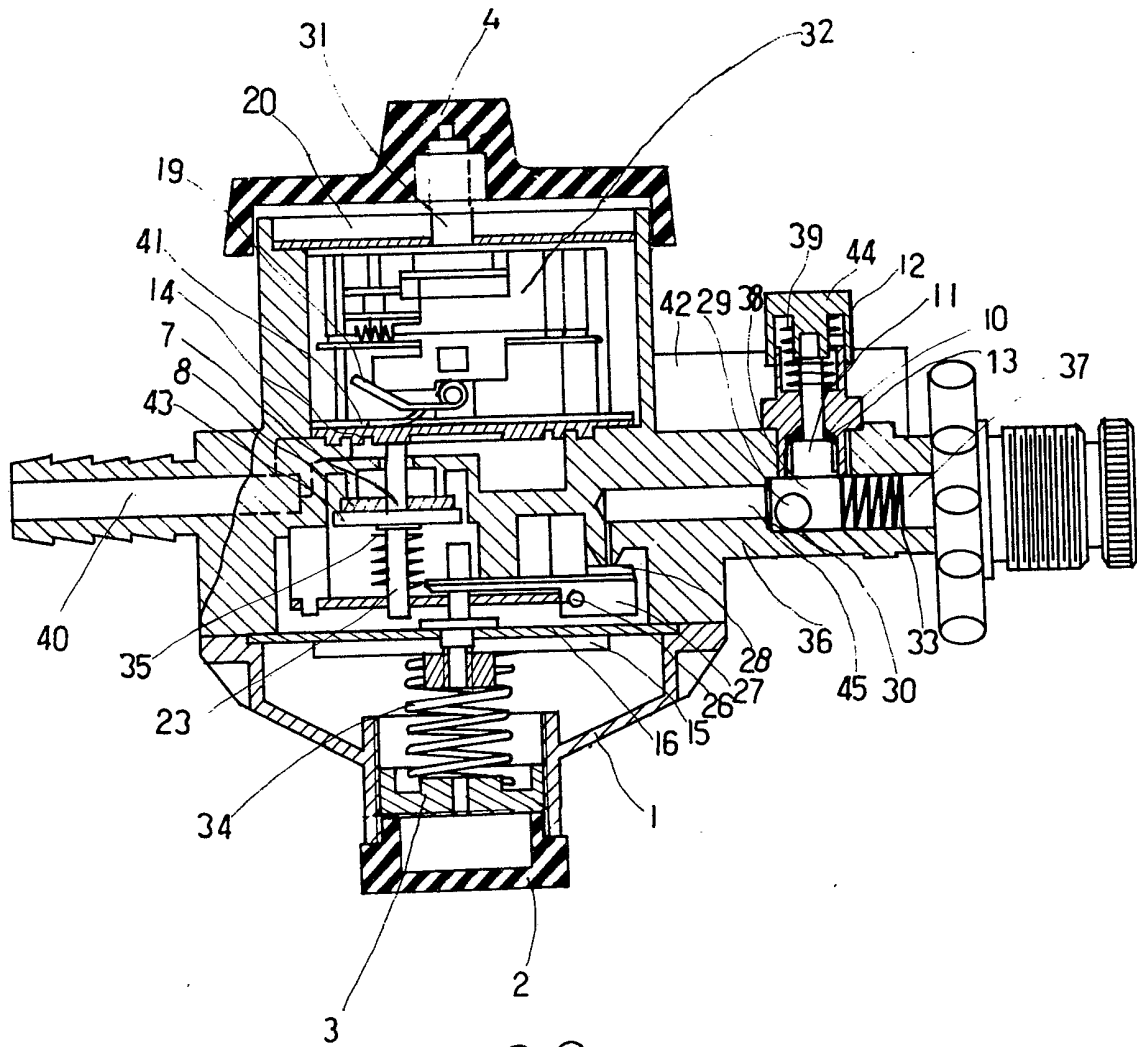


FIG. 3

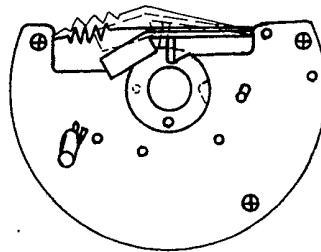
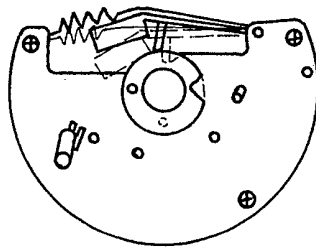
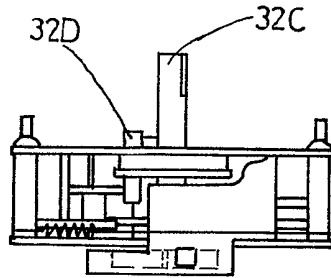


FIG. 4A

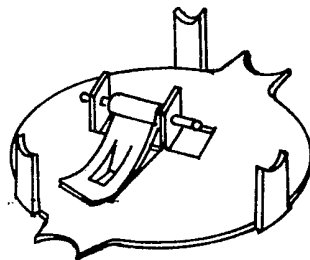


FIG. 4B

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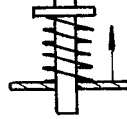
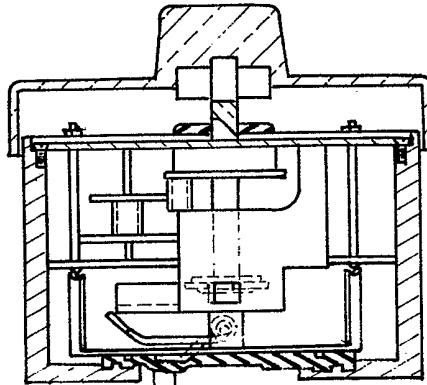


FIG.5A

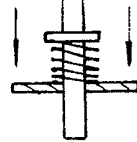
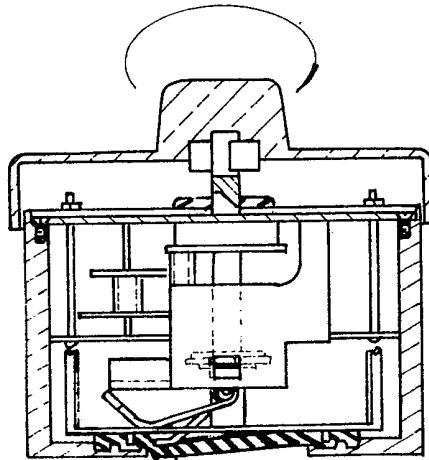


FIG.5B

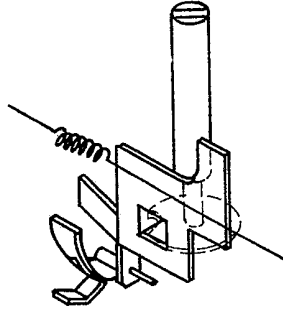


FIG. 6A

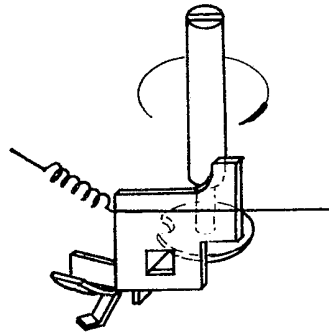


FIG. 6B

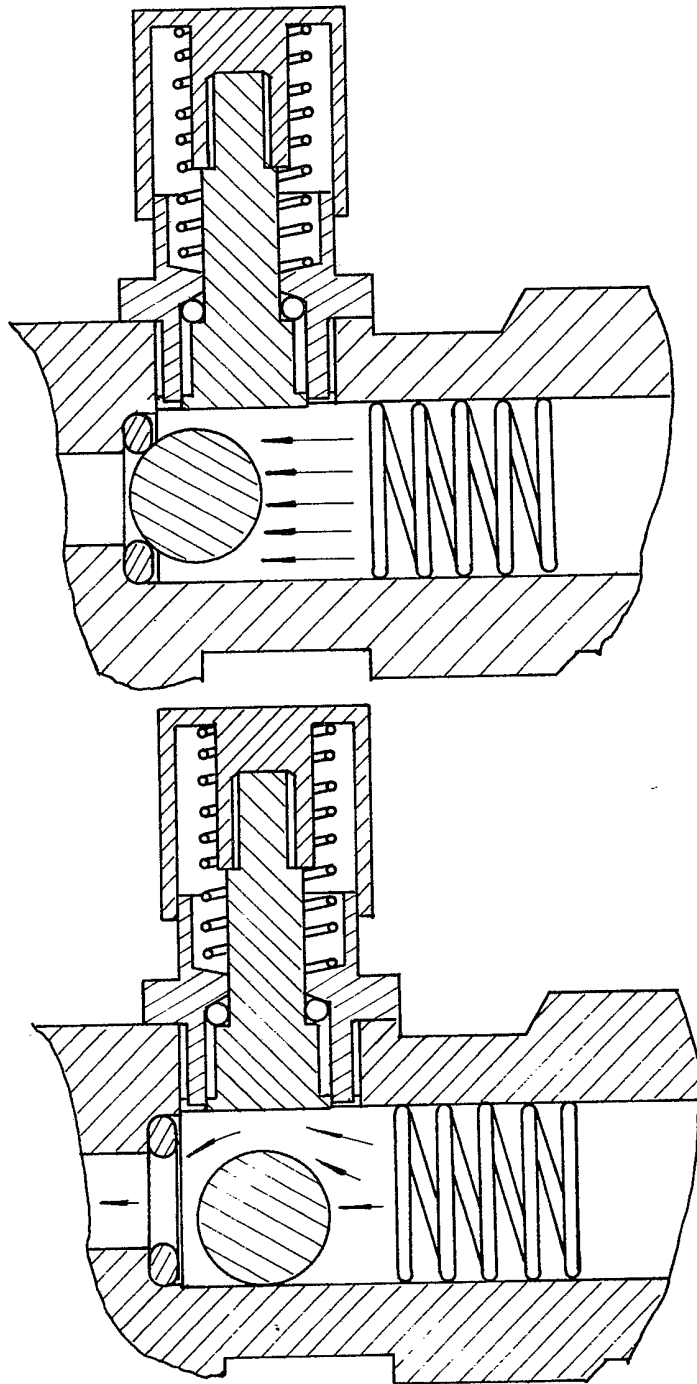


FIG. 7



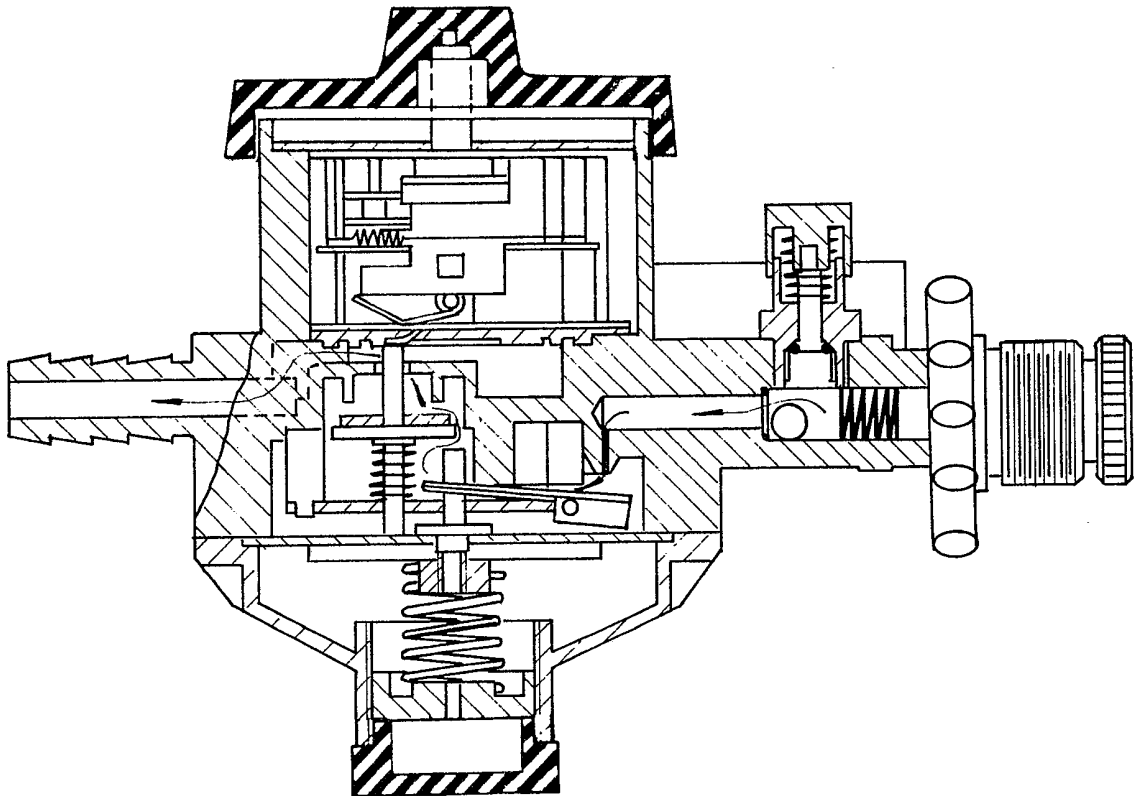


FIG. 8

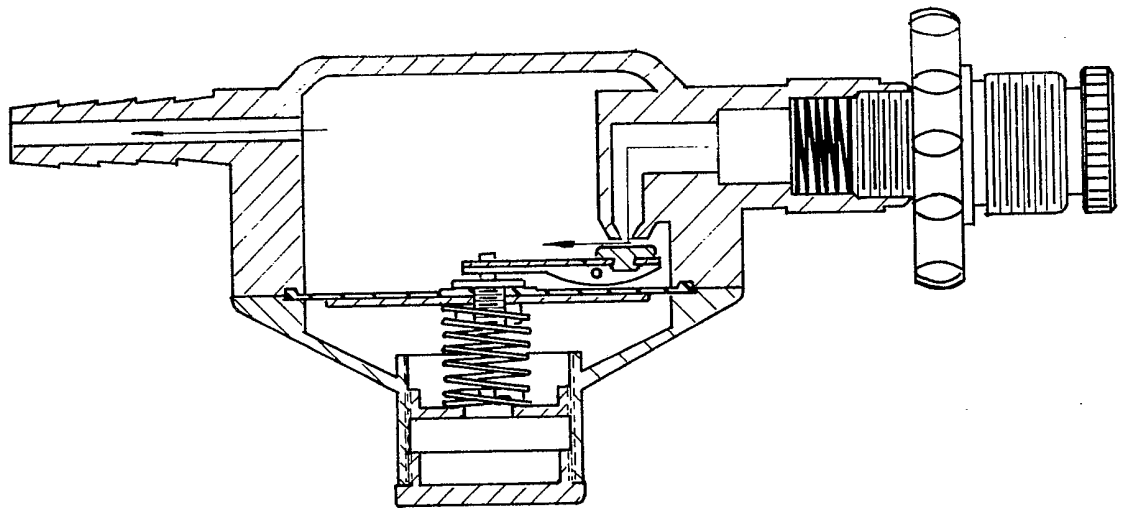


FIG. 9

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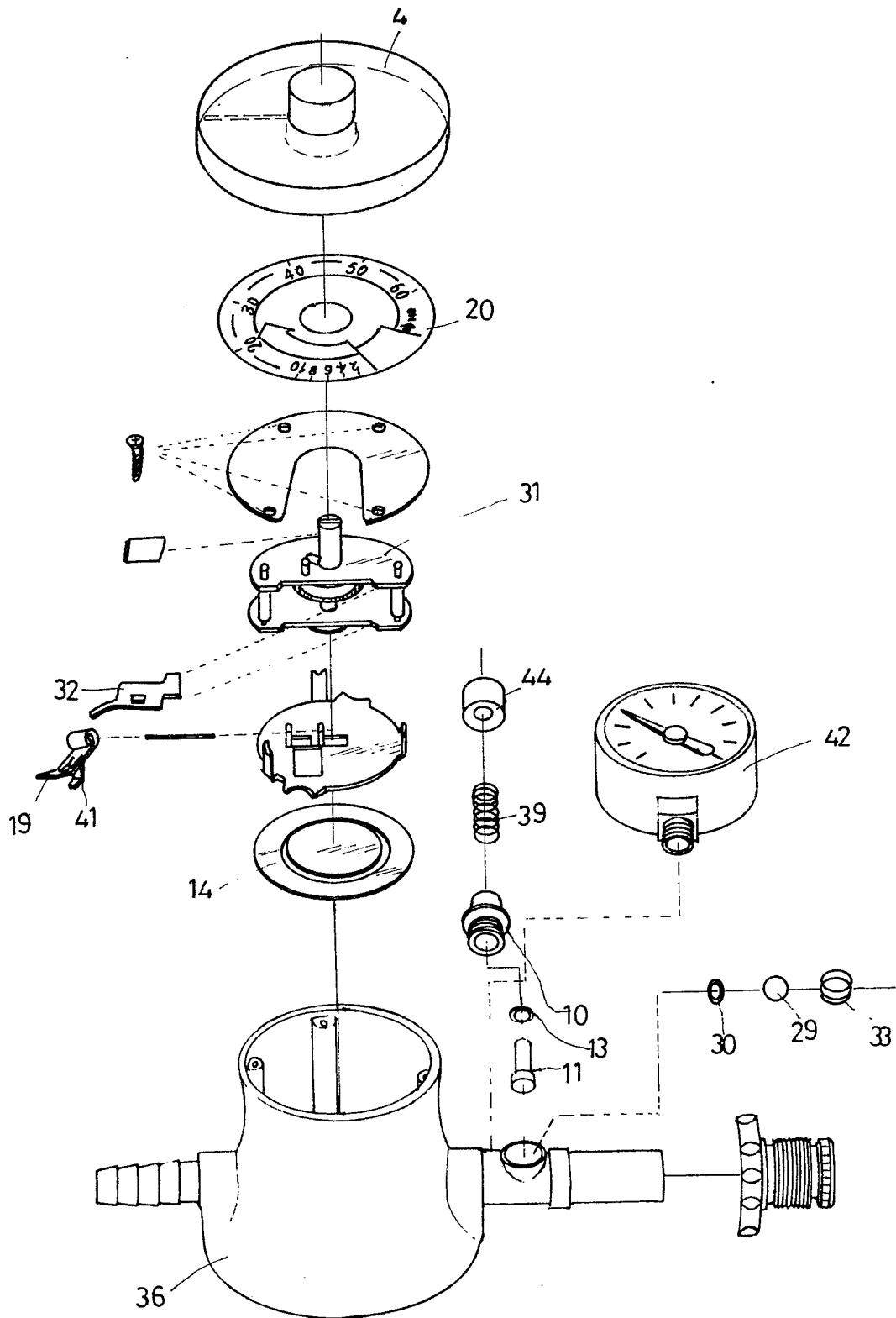


FIG.10

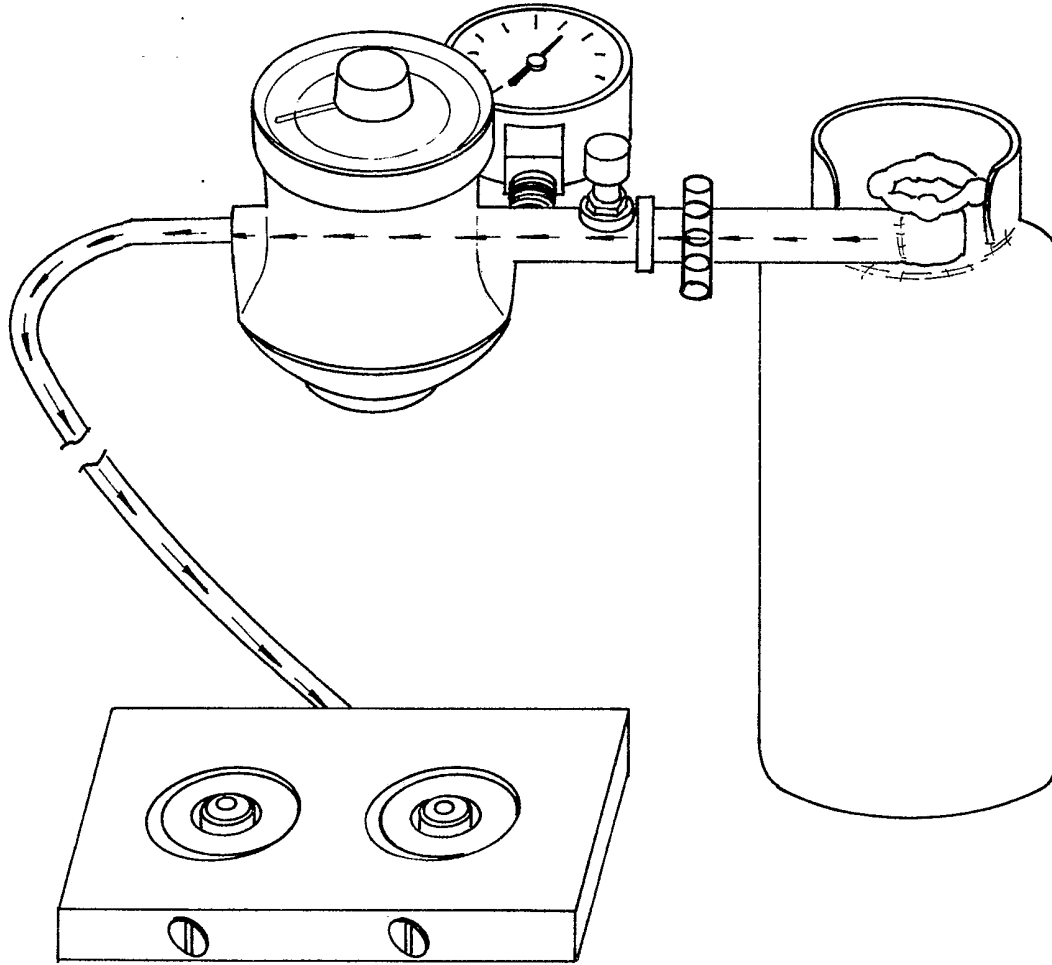


FIG. 11

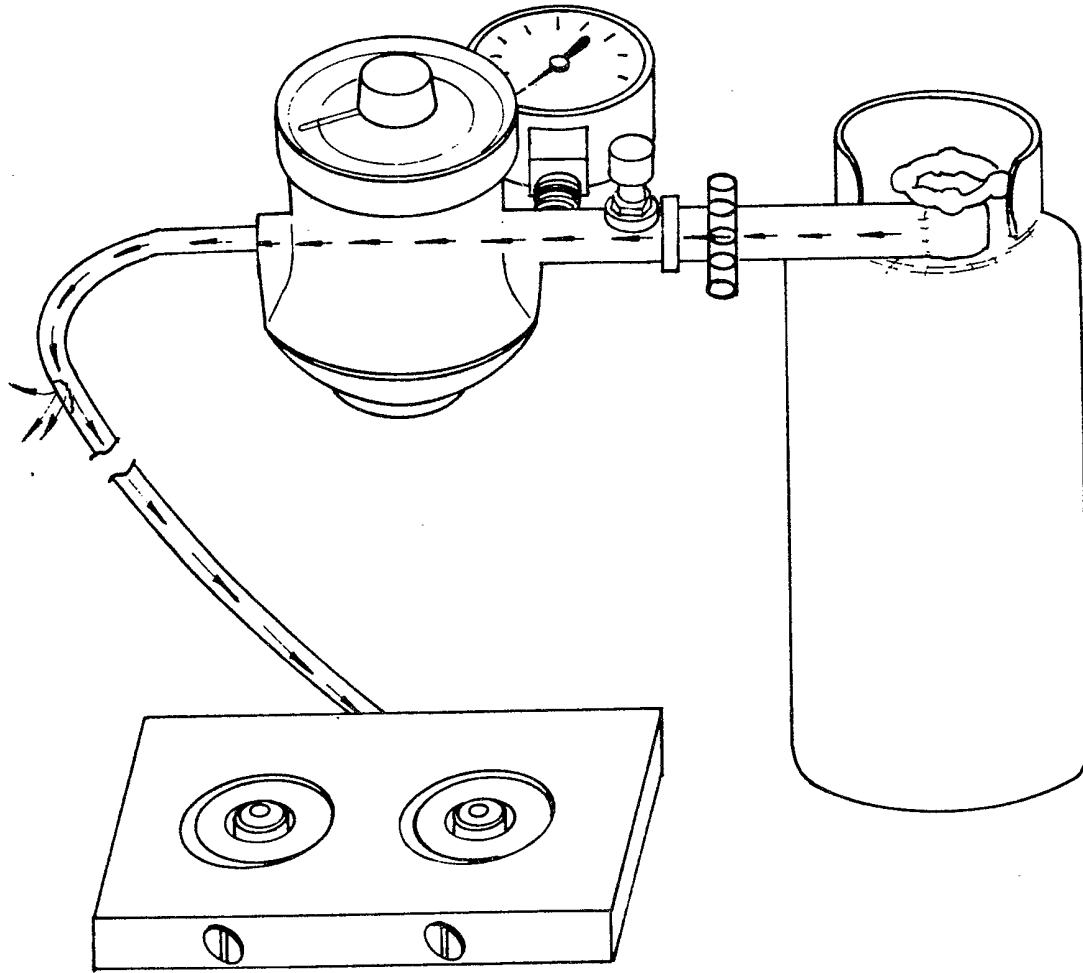


FIG.12

## SPECIFICATION

### Gas regulator with safety and timing means

- 5 The present invention relates to a gas regulator with safety and timing means, particularly to a gas regulator provided with a timer, a pressure-reducing regulator, and a safety valve at the inlet side of the main body
- 10 portion of the gas regulator with safety and timing means, by means of which, the gas flow rate can be controlled, the gas pressure can be reduced, the time allowed for the gas to pass through can be set, and the gas supply can be cut off in time while having excessive flow at the gas inlet.

Nowadays, gas is one of the most important energy sources, of which the economic value and practicality are much higher than those of any other energy sources; unfortunately, a large number of disasters are caused by carelessness every year. The main reasons why the disasters can happen are that the source switch cannot be cut off in time and has no safety and timing means.

The conventional gas regulator, without safety means, is generally used for controlling gas flow rate by means of reducing the gas pressure. The gas regulator is one of the main parts of a gas supply system, whereas the life of every regulator is limited. Once a gas regulator has been used in excess of its time limit, the gas regulator body may be broken on account of being oxidized. When a regulator body has been broken or does not work properly, it can be sure that a disaster would be caused to happen by gas leakage. The loss of wealth and human lives happens everywhere on account of using the gas regulator without safety means.

For the reasons stated above, the inventor of this invention designs a gas regulator with safety and timing means through numerous experiments and many-year research.

The most important uses of the present invention are as follows:

1/. Before the disaster is caused by the gas regulator having been used in excess of its time limit, or by the explosion of the gas regulator made improperly, the gas supply is cut off, so that the present invention is absolutely safe.

2/. In case the gas pipe of a gas oven is broken or is on fire, the present invention can immediately cut off the gas supply, so that the disaster caused by gas leakage never happens.

3/. While people are sleeping at night, the rat may bite out the gas pipe, which causes the gas to leak out of the gas pipe. The present invention would cut off the gas supply in time even when there is nobody on the spot.

4/. In event of earthquake, the gas pipe is probably disconnected by reason that the

gas tank falls down; thus, a large amount of gas would leak out. However, the present invention would cut off the gas supply in time even when there is nobody on the spot.

- 70 5/. When a neighboring house is caught fire, the inhabitants with horror escape from the house and probably forgot to turn off the switch of the gas tank. As a result, the gas tank may explode and enlarge the fire. If the present invention is used, the gas supply would be cut off immediately and the fire may not be enlarged by the explosion of the gas tank.

The present invention relates to a gas regulator with safety and timing means, particularly to a gas regulator provided with a timer, a pressure-reducing regulator, and a safety valve at the inlet side of the main body portion of the gas regulator with safety and timing means, by means of which, the gas flow rate can be controlled, the gas pressure can be reduced, the time allowed for the gas to pass through can be set, and the gas supply can be automatically cut off while having excessive flow at the gas outlet.

A spring timer, a main shaft, a wheel provided with a notch, a push plate, a lifting lever, a transmission lever, rubber sealing diaphragms, a piston valve, and a main body portion are combined as a whole.

When the main shaft of the timer is rotated, the notch of the wheel forces the push plate to move outwards; and at the same time, the lifting lever is pressed downward by the push plate, which through the rubber sealing diaphragm exerts a downward force; thus the piston valve through which the gas can pass, is opened.

When the main shaft of the timer gradually returns to the zero position due to the resilient force of the spring of the timer, the notch of the wheel again directs to the fin of the push plate, and the push plate at once moves inward, with the result that the forces applied to the push plate, the piston valve, the lifting lever, the rubber sealing diaphragm, and the transmission lever are released. Consequently, the piston valve is closed by means of the resilient force of the spring of the piston valve, and the gas supply is automatically cut off; moreover, due to the fact that gas exerts pressure on the piston valve. The piston valve is closed more tightly. In addition, the gas regulator according to the present invention dies not have the drawback of the faucet which is unable to close completely after having been used a long time.

A safety valve mainly comprising a packing ring, a stainless steel ball, and a spring for confining the movement of the stainless steel ball, being mounted at the inlet side of the gas regulator according to the present invention, can automatically cut off the gas supply while having excessive flow at the gas outlet, and is not influenced by external force.

The gas supply of about 60% of the families is by means of the gas tank, and the gas supply of the others is by means of the city gas. Nevertheless, it is necessary to use rubber tube to connect the gas oven. In general, the switch at the side of a gas oven has no safety and timing means described above. Thus the present invention is suitable for use in most of the families.

10 This invention will be best understood from a consideration of the following detailed description in view of the accompanying drawing forming a part of the specification: nevertheless it is to be understood that the invention is not confined to the disclosure, being susceptible of such changes and modifications which shall define no material departure from the salient features of the invention as expressed in the appended claims.

20 In the drawings:

*Figure 1* is a front view of a gas regulator with safety and timing means according to an embodiment of the present invention;

25 *Figure 2* is a top view of the gas regulator with safety and timing means according to the present invention;

*Figure 3* is a longitudinal cross-sectional view of the gas regulator with safety and timing means according to the present invention;

30 *Figure 4A* shows the timing means of the present invention at the positions of being turned on and being turned off;

35 *Figure 4B* is a perspective view of the base used for mounting the lifting lever of the present invention;

*Figure 5A* shows the relative positions of the timing means and the piston valve of the present invention;

40 *Figure 5B* shows how the timing means opens the piston valve of the present invention;

45 *Figure 6A* shows the relative positions of the push plate, the wheel provided with a notch, and the lifting lever when the timing means of the present invention is in normal state;

50 *Figure 6B* shows the relative positions of the push plate, the wheel provided with a notch, and the lifting lever when the timing means of the present invention is turned on;

*Figure 7* shows the safety means of the present invention in the states of being closed and opened;

55 *Figure 8* is a longitudinal cross-sectional view of the gas regulator with safety and timing means according to the present invention in normal flow condition;

60 *Figure 9* is a longitudinal cross-sectional view of a known gas regulator;

*Figure 10* is a fragmentary perspective view of the gas regulator with safety and timing means according to the present invention;

65 *Figure 11* shows how to connect the gas regulator with safety and timing means ac-

ording to the present invention to a gas oven and a gas tank;

70 *Figure 12* shows how to use the pressure gauge of the present invention to check the gas pipe.

Referring now to the drawings in detail and in particular to Fig. 3, A safety valve is mounted at inlet side (37) of main body portion (36). At the end of passage (38) are mounted a packing ring (30), a stainless steel ball (29), and a spring (33) for confining the movement of the stainless steel ball (29), which are used for closing the safety valve automatically and immediately while having excessive flow at the gas outlet. Thus the gas flow rate can be limited to a safe extent.

In normal flow condition, the safety valve opens due to the facts that the stainless steel ball (29) is attracted by gravitational force and the position of the stainless steel ball is different from that of the packing ring (30). In case of the pressure regulator being out of order or the gas pipe being on fire owing to accident, the gas flow rate will exceed the range of normal flow rate and will leak out. At that time, the stainless steel ball (29) will be pushed forward by the abrupt increase of the dynamic force of the gas flow; furthermore, on account of the pressure difference between the right side and the left side of the stainless steel ball (29), the stainless steel ball (29) is pushed forward into the packing ring (30) so as to close the safety valve. Since the packing ring is elastic and smooth, the stainless steel ball (29) can be immediately bound to the packing ring (30); also, the pressure at the right side is different from that at the left side, so that the stainless steel ball (29) is tightly bound to the packing ring (30). In consequence, the gas passage is exactly closed and the gas supply is cut off. Before the gas oven is to be used again, it is necessary to repair the gas oven first, and then the release button (12) is pressed downward in order to separate the stainless steel ball (29) from the packing ring (30) to open the gas passage.

The release button (12) is mounted at the inlet side (37) of the main body portion (36), and is fixed there by a screw (10). Inside the screw (10) is a hole into which a pin (11) is inserted, and in which a packing ring (13) is used for sealing the release button (12) is mounted. On the packing ring (13) is a spring (39) the lower of which is used for pressing the packing ring (13), and the upper of which is used for supporting the cap (44) of the release button (12) so as to maintain the normal position of the cap (44). The inner hole of the screw (10) and the pin (11) is sealed by the packing ring (13). In normal flow condition, the pin (11) and the screw (10) are further sealed by means of the high pressure of the gas flow, so that the high pressure gas can be separated safely and gas leakage will never happen.

In the right of the release button (12) is mounted a pressure gauge (42) through which the pressure of the gas tank can be measured and whether the gas pressure is evidently decreased or not can be instantly observed after cutting off the gas supply and turning off the gas oven. In case the gas pressure is evidently decreased, there must be leakage in the gas pipe; so we can change the gas pipe and safety can be ensured. At the end of the passage (45) is formed a nozzle, below which is a regulating-lever base (28). The regulating lever (27) used for regulating the gas flow rate, with a pin (26) as a fulcrum, is arranged under the regulating-lever base (28). The main body portion (36) is connected with a base cover (1) integrally made of metal, within which is mounted a spring (34) and a regulating screw (3), and at the lower of which is engaged with a cap (2). Between the base cover (1) and the main body portion (36) is a rubber diaphragm (16) used for preventing gas leakage and regulating the pressure. The rubber diaphragm (16) can be swelled or shrunk by adjusting the regulating screw (3). When the gas supply is turned on, the gas passes through the connecting pipe, the passage (38), and the nozzle to the place between the main body portion (36) and the base cover (1); so the outlet of the nozzle can be controlled by adjusting the screw (3). In consequence, the high pressure gas is reduced to a low pressure gas constantly maintaining in 280 mm Hg.

In the inner of the main body portion (36) is a chamber, into which a piston valve (7) and a spring (35) are mounted. Being pressed by the spring (35), the piston valve (7) is tightly closed by a seal diaphragm (8); so the gas cannot flow into the top of the main body portion (36) (i.e. the outlet of the outer chamber).

The piston valve (7) is integrally made of metal, at the center of which is mounted a rod (23), and upon which are mounted the seal diaphragm (8) and a seat (43) used for fixing the spring (35). The gas whose pressure has been reduced is controlled and directed by the piston valve (7) before it passes through the gas passage (40) to the gas oven. On the top of the piston valve (7) is a seal diaphragm (14) for preventing the gas from leaking to the timer (31) located at the top of the main body portion (36), the timer (31) being a specially designed spring timer. When the timer (31) is turned counterclockwise, gas can continuously flow to the gas oven; when the timer is turned clockwise, the time allowed for the gas to pass through can be randomly set within 60 minutes. A wheel provided with a notch is fixed to the lower part of the main shaft of the timer (31), and can be rotated with the main shaft of the timer (31). When the main shaft of the timer (31) is turned clockwise, the wheel provided with a notch is rotated with

the main shaft simultaneously and leaves the zero position, with the result that the arm of the push plate (32) is forced by the notch to move outwards. Besides, the lifting lever (19) is lowered to push transmission lever (41) and the seal diaphragm (14) downward. The piston valve (7) then opens.

When the spring timer (31) returns to its original position, the notch of the wheel is also returned to its original position (i.e., the closed position). At that time, the wheel exerts no force on the overhanging arm of the push plate (32). The resilient force of the spring (35), through the seal diaphragm (14), the transmission lever (41), and the lifting lever (19), is transmitted to the push plate (32) and causes the fin of the push plate (32) to engage with the notch of the wheel. Thus, the dynamic force disappears; the piston valve (7) is closed at once; and the timer stops rotating. Furthermore, the push plate (32) moves inward, the main shaft (32C) of the timer returns to the off position, and a pin (32D) just contacts the main shaft (32C), thereby the off position can be fixed.

On the top of the main body portion (36) is mounted a turning cover (4) integrally made of plastics and by die casting, which is engaged to the main shaft (32C) of the timer (31), and with the help of which the main shaft (32C) of the timer is easily rotated. In accordance with the instruction of the board (20), the time allowed for supplying gas can be set conveniently. At the time the timer (31) is turned clockwise, there are following actions:

- 1/. The gas passage opens.
- 2/. The spring of the timer (31) is rotated.
- 3/. The time allowed for supplying gas to the gas oven is set.

#### CLAIMS

1. A gas regulator with safety and timing means, mainly comprising a stainless steel ball, a spring used for confining the movement of said stainless steel ball, a packing ring, a release button, a spring timer, a push plate with an overhanging arm and a fin, a wheel provided with a notch, a lifting lever, a base for mounting said lifting lever, a transmission lever, seal diaphragms, a piston valve, a regulator base with switch, and a waterproof transparent turning cover.
2. A gas regulator with safety and timing means as claimed in claim 1, wherein said spring timer can be used for controlling gas flow rate and cutting off the gas supply at the set time, so that the danger caused by carelessness or forgetfulness can be prevented.
3. A gas regulator with safety and timing means as claimed in claim 1, characterized in that when the main shaft of said spring timer is turned, the said wheel provided with a notch is rotated with the main shaft, the notch of said wheel is forced to leave said overhang-



ing arm of said push plate, said push plate is pushed outwards by the rim of said wheel to press down said lifting lever, and said transmission lever by means of said diaphragm  
5 presses down said piston valve, so that the gas can flow through the regulator until the main shaft of the said timer returns to its original position or the set time is reached,  
10 and said piston valve of said regulator is closed by means of the spring of said timer and the pressure of the gas.

4. A gas regulator with safety and timing means as claimed in claim 1, wherein said release button comprising a cap, a pin, a  
15 screw, a spring, and a packing ring, is used for separating said stainless steel ball from said packing ring, and has a simple and accurate structure for preventing gas from leaking.

20 5. A gas regulator with safety and timing means as claimed in claim 1, characterized in that the gas supply can be immediately cut off by means of said stainless steel ball, said spring for confining the movement of said  
25 stainless steel ball, said packing ring, and said release button while having overflow at the outlet on account of carelessness and forgetfulness.

30 6. A gas regulator with safety and timing means as claimed in claim 1, characterized in that the gas passage will open in normal condition on account that the stainless steel ball is attracted by gravitational force.