J. W. CHRISTIAN.

GAS SHUT-OFF DEVICE.

APPLICATION FILED DEC. 15, 1920.

1,402,837.

Patented Jan. 10, 1922.

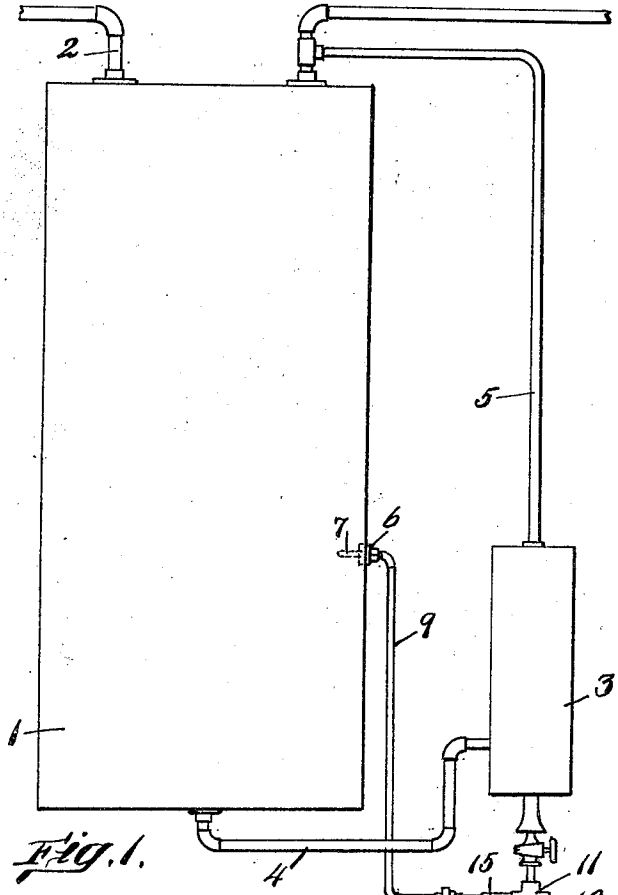


Fig. 1.

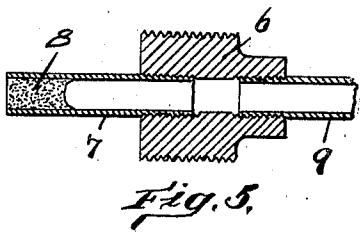


Fig. 5.

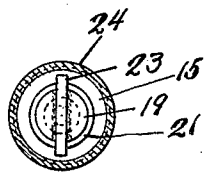


Fig. 4.

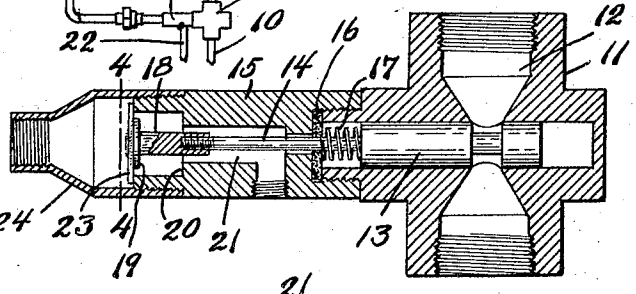


Fig. 2.

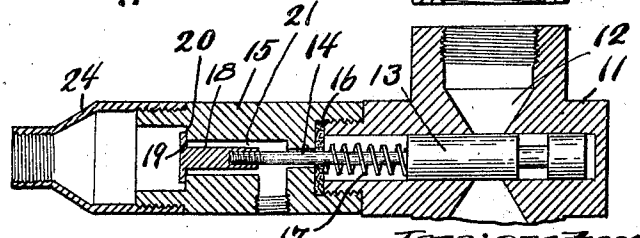


Fig. 3.

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UNITED STATES PATENT OFFICE.

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GAS-SHUT-OFF DEVICE.

1,402,837. Specification of Letters Patent. **Patented Jan. 10, 1922.**

Application filed December 15, 1920. Serial No. 430,898.

To all whom it may concern:

Be it known that I, JOSEPH W. CHRISTIAN, a citizen of the United States, and a resident of Haverhill, county of Essex, State of Massachusetts, have invented an Improvement in Gas-Shut-Off Devices, of which the following is a specification.

This invention relates to devices for automatically shutting off the gas to the burner of a water heater, when used in connection with a domestic boiler, and has for object to provide means whereby, when the burner is accidentally permitted to burn too long, so that nearly all the water in the boiler becomes heated close to the boiling point, or to a point such that there would be danger of bursting of the boiler, the gas supply to the burner will be automatically cut off.

More specifically my invention has for its object to provide an improved means for securing the result above described, which is simple in construction and positive and reliable in operation and which is adapted to be applied to a water heating system already installed.

I accomplish these objects by providing the construction hereinafter described and disclosed in the accompanying drawings in which:

Fig. 1 is a diagrammatical view, illustrating the application of my invention to a domestic water heating system.

Figs. 2 and 3 are central longitudinal sections of the gas shut-off valve.

Fig. 4 is a sectional view, at line 4—4 of Fig. 2.

Fig. 5 is a longitudinal sectional view of the fusible plug fitting.

In Fig. 1 a diagram of a commonly employed domestic water heating system is illustrated, in connection with the automatically operating apparatus which I preferably employ, and in which the upright boiler 1 is shown as connected to the water supply pipe 2 from the street main, and as connected to the gas heater 3 by circulation pipes 4 and 5.

According to my invention I provide a fusible plug in the side of the boiler arranged at a point somewhat above the bottom, though not necessarily at the point indicated, said plug comprising a tubular fitting 6, which is screwed into, or otherwise secured in the side of the boiler, and a short tube 7, which is screwed into the inner end of the fitting, so that it projects into the boiler, the passageway therethrough being filled with a plug 8 of fusible metal, which is adapted to melt at approximately 200° F. A pipe 9 is connected to the outer end of the fitting 6 and leads to the automatic releasing device for the gas shut off hereafter described.

The gas, or other fuel, is supplied to the burner of the heater 3 through a pipe 10, and a valve casing 11 is located in said pipe, so that the gas flows through the passageway 12 therethrough. A piston valve 13 is arranged to control said passageway and is provided with a stem 14, which extends into a bonnet 15, threaded on the valve casing, said stem passing through a packing washer 16, which is clamped between the bonnet and casing. A spring 17 is arranged between the washer 16, which rests against the end of the bonnet 15, and the end of the piston 13, so that said spring tends to move the piston to closed position. A stem extension 18 is connected at one end to the stem 14, and has a valve disk 19 on its opposite end, which is adapted to seat against a shoulder 20, formed about a passage 21 through the bonnet, said passage extending longitudinally thereof and then transversely, and being connected to a pipe 22, which in practice will be connected to a sewer, or other suitable waste outlet.

A cross bar 23 is connected by fusible solder to the opposite side of the valve disk 19, from the stem 18, said bar being connected while the valve is in the open position, and being of sufficient length to engage the end of the bonnet and hold the valve in open position against the action of spring 17, as shown in Fig. 2. A nipple 24 is connected at one end to the end of the bonnet and at the opposite end to the pipe 9.

The valve 13 being set in the position of Fig. 2, and the parts being arranged as above described, the operation is as follows: When the heater has been operated for such a length of time that the temperature of the water in the boiler at the level of the fitting 6 is raised nearly to the boiling point, or to such a point that there is danger of bursting, the plug 8 will become fused, so that water from the boiler will flow through pipe 9 into the valve bonnet, through passage 21 and into the waste pipe 22, flow past the valve disk 19 being permitted, as the bore of the outer portion of the bonnet is of substantially greater diameter than that of the

disk and the retaining bar 23 does not materially obstruct this flow.

The hot water thus comes in direct contact with the solder which connects the bar to the disk 19, and the fusing point of which is such that it will be fused thereby even though the temperature of the water is considerably lower than that required to fuse the plug 8. As soon as the solder, which retains the valve in open position, fuses, the spring 17 will act to move the valve 13 to closed position, as shown in Fig. 3, shutting off the flow of gas to the burner and at the same time seating the disk 19 against the shoulder 20, so that further waste of water through the pipe 9 will be prevented.

The action of the spring 17 in closing the gas valve, when released, is assisted by the impact and pressure of the water against the disk 19, and, in fact, the construction permits the entire omission of the spring 17, particularly if the space provided for the escape of water past the disk is suitably restricted.

If the spring 17 were omitted, the cross bar 23 might also be omitted as there would be no action tending to close the shut-off valve, unless the plug 8 should become fused, so that the water would be admitted to the nipple 24.

In case the cross bar is employed, which is preferable, the provision of a construction permitting the water from the boiler to flow past the fusible solder, which retains the cross bar 23 in position, is especially desirable, as it insures the application of water at nearly boiler temperature thereto. This construction also provides a means of relieving the boiler pressure and permitting cold water to flow into the boiler in case the gas shut-off valve should stick and not be closed by the action of the spring and the water pressure, or in case the solder which retains the cross bar should not be fused.

It will be understood that the apparatus is designed to operate only in case of special emergency, and when there is danger of explosion, and that the boiler cannot be used again until the whole apparatus has been reset.

I claim:

1. In a water-heating system, a boiler a heater therefor, a fuel burner for said heater and a fuel conductor leading to said burner, a shut-off valve for said conductor, means normally actuated to move said valve to closed position, fusible holding means for retaining said valve in open position, a water connection leading from the boiler to a waste outlet and in which said fusible holding means are arranged, a fusible plug for closing said connection at its inlet arranged to be fused when the boiler temperature is raised to a predetermined point, to permit the water from the boiler to pass into contact with said fusible holding means and cause said valve to be released, and means arranged to be actuated by movement of said valve to closed position to close said water connection.

2. In a water heating system, a boiler, a heater therefor, a fuel burner for said heater and a fuel conductor leading to said burner, a shut-off valve for said conductor, normally actuated to be moved to closed position, fusible holding means for retaining said valve in open position, a chamber in which said holding means is located, a pipe leading from the boiler to said chamber and a waste outlet leading therefrom, and temperature controlled means normally closing said pipe and adapted to open the same when the boiler temperature reaches a predetermined point, to permit the water from the boiler to pass through said chamber into contact with said holding means.

3. In a water heating system, a boiler, a heater therefor, a fuel burner for said heater and a fuel conductor leading to said burner, a shut-off valve for said conductor, normally actuated to be moved to closed position, fusible holding means for retaining said valve in open position, a chamber in which said holding means is located, a pipe leading from the boiler to said chamber and a waste outlet leading therefrom, and temperature controlled means normally closing said pipe and adapted to open the same when the boiler temperature reaches a predetermined point, to permit the discharge of water from the boiler to said chamber, thereby to fuse said holding means and permit closure of said valve, and means connected to said valve arranged to prevent the discharge of water from said chamber when the valve is in its closed position.

4. In a water heating system, a boiler, a heater therefor, a fuel burner for said heater and a fuel conductor leading to said burner, a shut-off valve for said conductor having a stem, a spring arranged to move said valve to closed position, a casing having a passageway therethrough and into which said stem extends, a retaining bar having a fusible connection with said stem and arranged to engage said casing to hold said valve in open position, means on said stem arranged to seat in said casing, to close the passageway therethrough in the closed position of said valve, a pipe leading from the boiler to one end of said passageway and temperature controlled means normally closing said pipe and adapted to open the same when the boiler temperature reaches a predetermined point.

5. In a water heating system, a boiler, a heater therefor having a fuel burner and a fuel conductor leading to said burner, a normally open shut-off valve in said conductor, a water-chamber having a pipe leading thereto from the boiler and having a nor-

mally open waste outlet leading therefrom, means normally closing said pipe arranged to permit water to flow from the boiler through the pipe to said chamber when the water at the pipe entrance reaches a predetermined temperature, and means, in said chamber, arranged to be operated by the action of the water flowing through said chamber to said outlet, to move said valve to its closed position.

6. In a water heating system, a boiler, a heater therefor having a fuel burner and a fuel conductor leading to said burner, a normally open shut-off valve in said conductor, a water chamber having an inlet at one end and a normally open waste outlet at the opposite end, a stem connected to said valve and extending into said chamber, a disk on said stem constructed and arranged to permit restricted flow of water through said chamber to said outlet when in normal position and movable from said position toward said outlet to move said valve to closed position, a pipe leading from the boiler to said chamber inlet and means for normally closing said pipe adapted to be fused, when the temperature of the water in the boiler reaches a predetermined temperature, to permit the flow of water from the boiler through said pipe and chamber to said outlet and to apply pressure to said disk to move the same in a direction to close said valve.

7. In a water heating system, a boiler, a heater therefor having a fuel burner and a fuel conductor leading to said burner, a normally open shut-off valve in said conductor, a water chamber having an inlet at one end and a normally open outlet at the opposite end, a stem connected to said valve and extending into said chamber, a disk on said stem loosely fitting said chamber to permit a restricted flow of water therethrough when in normal position and movable from said position toward said outlet to move said valve to closed position and to close said outlet when the valve is in closed position, a pipe leading from the boiler to said chamber inlet and means for normally closing said pipe adapted to be fused when the water in the boiler reaches a predetermined temperature, to permit the flow of water from the boiler through said pipe and chamber to said outlet and to apply pressure to said disk to move the same in a direction to close said valve.

8. In a water heating system, a boiler, a heater therefor having a fuel burner and a fuel conductor leading to said burner, a normally open shut-off valve in said conductor, a water chamber having an inlet at one end and a normally open outlet at the opposite end, a stem connected to said valve and extending into said chamber, a disk on said stem loosely fitting said chamber to permit a restricted flow of water therethrough when in normal position, and arranged, when moved toward the outlet end of the chamber, to cause closing movement of said valve, fusible holding means in said chamber for retaining said valve in said normal position, spring-actuating means for moving said valve from said position to closed position when released by said holding means, a pipe leading from the boiler to said chamber inlet, and means for normally closing said pipe adapted to be fused when the water in the boiler reaches a predetermined temperature, to permit the water therein to flow through said chamber and said outlet and fuse said holding means and apply pressure to said disk in a direction to move the valve to closed position.

In testimony whereof I have signed my name to this specification.

JOSEPH W. CHRISTIAN.