(No Model.)

2 Sheets—Sheet 1.

H. H. CUMMINGS.

AUTOMATIC SAFETY ATTACHMENT FOR GAS BURNERS.

No. 532,142. Patented Jan. 8, 1895.

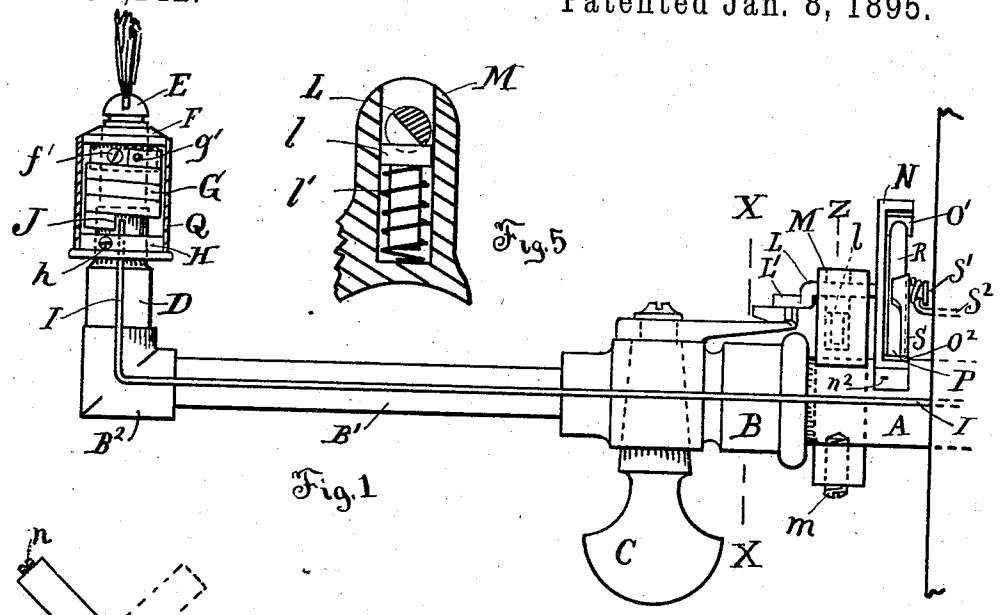

Fig.1

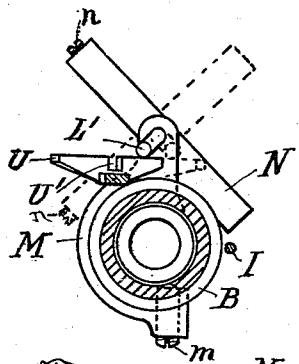

Fig.3

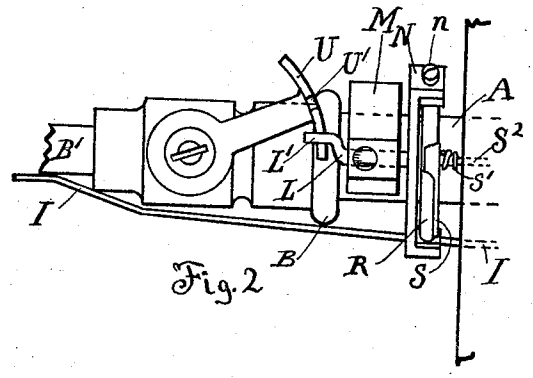

Fig.2

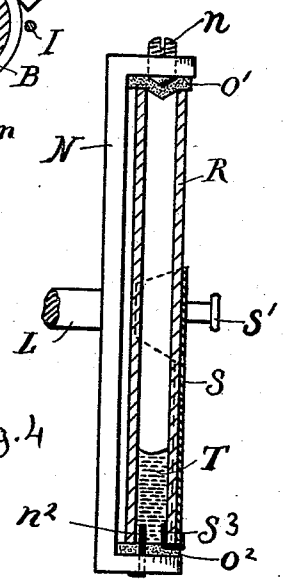

Fig.4

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Inventor:
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(No Model.) 2 Sheets—Sheet 2.

H. H. CUMMINGS.

AUTOMATIC SAFETY ATTACHMENT FOR GAS BURNERS.

No. 532,142. Patented Jan. 8, 1895.

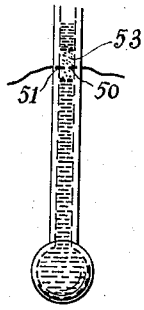

Fig. 9.

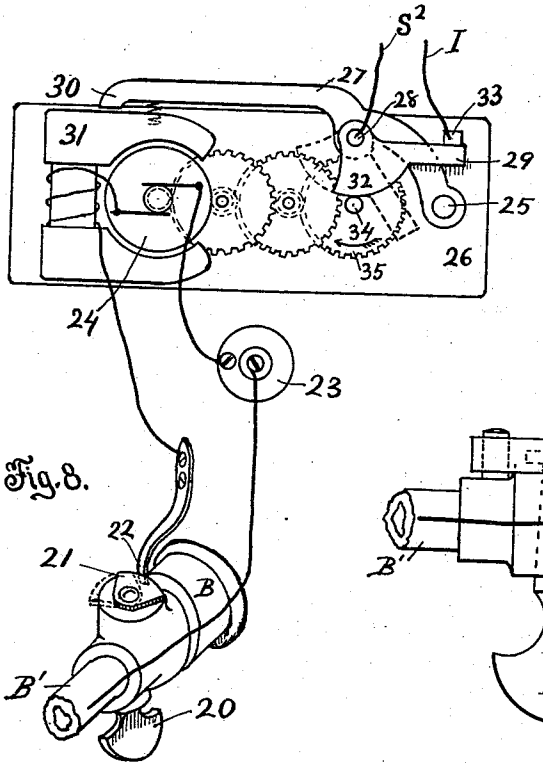

Fig. 8.

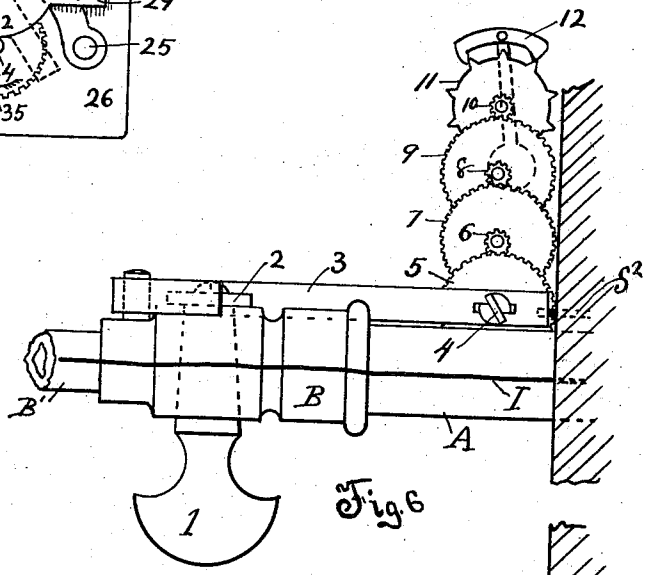

Fig. 6

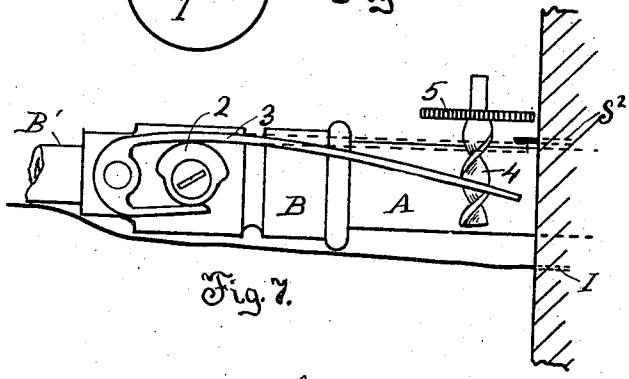

Fig. 7.

Witnesses;
A. D. Harrison.
E. Batchelder

Inventor;
Henry H. Cummings.

UNITED STATES PATENT OFFICE.

HENRY H. CUMMINGS, OF MALDEN, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO ALBERT D. CROMBIE, OF SAME PLACE.

AUTOMATIC SAFETY ATTACHMENT FOR GAS-BURNERS.

SPECIFICATION forming part of Letters Patent No. 532,142, dated January 8, 1895.

Application filed January 19, 1894. Serial No. 497,344. (No model.)

To all whom it may concern:

Be it known that I, HENRY H. CUMMINGS, of Malden, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Automatic Safety Attachments for Gas-Burners, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

My invention relates to such improvements in safety attachments for gas burners or fixtures as shall automatically cause an alarm to be sounded, or cause a gas supplying valve to be closed, or both to be done, in case the gas is flowing unlighted from the burner. I attain these objects in a simple and effective manner by the principles and mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation as viewed from the right of an ordinary gas fixture and burner with the mechanism of my invention mounted thereon and showing the circuit broken at J and closed at P, in a manner hereinafter described. In this view the hood or shield Q is broken away so as to expose the thermostatic circuit-breaking devices within. Fig. 2 is a top view of the valve or cock and the parts on and in the rear of the same. Fig. 3 shows a section through line $x\ x$, as viewed from the left in Fig. 1, and shows in solid lines the valve actuated mechanism in position to close the circuit, and in dotted lines the same mechanism in position to break the circuit. Fig. 4 is an enlarged vertical section of portions of the valve actuated circuit closing and breaking mechanism. Fig. 5 is an enlarged vertical section through line Z, Fig. 1, showing portions of the valve actuated mechanism to be hereinafter described. Fig. 6 is a side elevation and Fig. 7 is a top view of a modified construction of the valve actuated circuit closing mechanism to be hereinafter described. Fig. 8 is a perspective front elevation of the valve actuated portions of still another form of construction by means of which the principles of my invention may be put in operation to be hereinafter described. Fig. 9 is an elevation showing a form of thermostatic circuit breaker to be hereinafter described.

Similar letters and figures refer to similar parts throughout the several veiws.

The gas pipe A, valve portion B, and parts B′ B^2, burner D and tip E are such as are ordinarily used in gas lighting, and in themselves form no part of my invention. Firmly mounted upon the gas pipe A is the bracket M, secured in position by set screw m and provided in its upper portion with a horizontal bearing in which is loosely mounted the oscillating crank shaft L. To the rear end of said crank shaft is affixed a clamp or holder N, having at one end a regulating screw n, and at the other end a contact point n^2.

Located between the rearwardly projecting arms of the clamp N, is a tube or guide R (which is composed of material that is a non-conductor of electricity, preferably glass), provided at its ends with the porous, compressible, non-conducting heads O′ O^2, composed preferably of leather.

Securely attached to the tube R and insulated from clamp N is a fixture S, provided with the contact pin S′, and the contact point S^2, the latter projecting into the interior of the tube R.

Within the tube is a movable circuit closing and breaking device T, (Fig. 4,) which is a conductor of electricity and is preferably a mass of quick-silver, said device being adapted by gravity to seek the lower end of the tube R. For convenience I will hereinafter allude to the said circuit closing and breaking device as the retarded circuit closer.

The speed with which the retarded circuit closer operates is controlled by the quantity of air which is allowed to pass through the porous head at the end of the tube R, and the passage of the air is governed by the regulating screw n operating to compress the said porous head, more or less.

When the retarded circuit closer T arrives at the position shown in Fig. 4, the tube, N, being moved to the position shown in full lines in Fig. 3, to cause the retarded circuit closer to arrive at said position the circuit is completed between the contact points n^2 and S^2, and when the tube is tilted to the position

shown in dotted lines in Fig. 3, the retarded circuit closer gravitates away from the points n^2 and S^3 and breaks the circuit.

The heads O′ and O^2 are sufficiently porous to allow the passage through them of air but not of quick-silver.

The forward end of the crank shaft L is provided with the crank L′, which is held down upon the notched sector U, by the action of the plunger l and spring l' upon the flattened under side of the crank shaft L, (as shown in Fig. 5,) which normally tends to hold the crank L′ centrally in a downward position, and causes it to descend, into the notch U′ of sector U, whenever it is oscillated past the position of said crank L′, said notch then carrying the crank within it until the continued movement of the notch has caused the crank L′ to swing up out of said notch on the opposite side, when the sector passes along under the crank and holds it in its last position until the action of the sector and its notch is reversed, when the crank is thrown back into its former position.

The sector U is firmly mounted on the valve or cock C, and so adjusted that when the gas is turned on or off the sector travels with the cock and serves to actuate the circuit closing and breaking mechanism before described, the retarded circuit closer being caused to make contact with the points n^2 S^3 after the cock has been turned a considerable length of time.

Secured by set screws f' to the burner D near the tip E is a collar F which supports a thermostatic circuit breaker here shown as composed of a metal strip G, preferably coiled in a helical form and attached at one end to the said collar at g', its other end being free.

Secured by the set screw h to the burner D is the collar or flange H (made of material that is non-conducting), which supports the insulated wire I, said wire I and circuit breaker G being so adjusted in relation to each other that when the gas is not lighted and the burner D and circuit breaker G are cold the free end of circuit breaker G and insulated wire I are in contact at J (Fig. 1), thus closing the circuit at that point, and when the gas is lighted the parts being warmed cause the free end of circuit breaker G to move away from contact with wire I by expansion of the strip or circuit breaker G, thus breaking the circuit. The metal portions of the gas fixture are utilized as parts of the electric circuit, there being sufficient insulation between the fixture and the wire I.

Surrounding the coil G and resting upon the collar or flange H is the shield or hood Q designed to protect the parts attached to the burner, the current passing through the points D, B^2, B′, B, sector U, shaft L, and clamp N, to contact point n^2. The ends of wires S^2 and I (not shown) may be attached to the wires of the ordinary annunciator bells such as are commonly connected with each room of hotels, &c., or said wires S^2 and I may be connected with the motor of an electrically actuated gas supplying valve, so as to cause said bell to ring or said gas supplying valve to close and shut off the gas, when the circuit is closed at P and J simultaneously.

Having described the construction of the parts, I will now proceed to explain the operation of the same.

When the cock is closed the tube N is held in the inclined position shown in dotted lines in Fig. 3, the end containing the contact points, n^2 o^2, being therefore elevated, and the retarded circuit closer being depressed in the opposite end of the tube. When the gas is turned on, the cock or valve is carried into the position shown in Fig. 1, and the sector U, by means of the notch U′, carries the crank L′ to the left and causes the clamp N attached to the rear end of the crank shaft L to be tilted into an inclined position substantially like that shown in Figs. 1, 2, and 3, carrying with it the tube R and the other parts relating thereto, the tube being thus given the opposite inclination shown in full lines in Fig. 3. This inclination of the tube R raises the circuit closer to the higher end of the tube and causes it to start by the action of gravity, but with a retarded motion, for the lower end, which now contains the contact points n^2 and S^3. The porous heads O′ and O^2 having been previously compressed to the proper degree of density, the retarded circuit closer will be (for example) about five minutes, more or less, in reaching the contact points n^2 and S^3, when the circuit at this point will be closed and the annunciator bell will ring, or the electrically actuated gas supplying valve will be closed, unless the circuit has been previously broken at the point J, which break only takes place when the gas is lighted and the thermostatic circuit breaker G warmed thereby. The expansion of the circuit breaker G requires much less time than is required for the journey of the retarded circuit closer T to the contact points n^2 and S^3. In case the light is extinguished and the valve left open, the thermostatic circuit breaker G (when it gets cooled down enough) will again complete the circuit at this point, and the alarm will he given or the supply of gas shut off. When the gas is properly turned off, the tube R is tilted to substantially the angle shown in dotted lines in Fig. 3, and the circuit closer therein travels away from the contact points n^2 and S^3 and the circuit is broken at this point before the thermostatic circuit breaker has cooled down sufficiently to make a contact at J.

It will be seen that the heat-actuated circuit breaker nullifies the action of the retarded circuit closer, when the gas has been properly lighted, so that while said circuit closer makes its circuit closing movement after the gas is turned on, such movement is nullified or made ineffectual by the previous breaking of the circuit by the heat-actuated circuit breaker.

The difference in time between the operation of the thermostatic circuit breaker and the retarded circuit closer is such that when the gas is properly lighted the thermostatic circuit breaker breaks the circuit before the retarded circuit closer can operate to close the circuit or make contact with the contact points, n^2 o^2, this difference in time being due to the retardation of the movement of the mercury, T. When the gas is shut off the retarded circuit closer leaves the points, n^2 o^2, and breaks the circuit before the thermostatic circuit breaker can have time to close the circuit.

In Fig. 1, the thermostatic circuit breaker is shown in the form of a helical coil, but it may be composed of layers of different metals or other material, straight or otherwise, and arranged to operate on the same principle in any well known manner, or it may be made in a manner similar to the ordinary thermometer, as shown in Fig. 9, with the mercury column divided by a non-conducting material, 53, such as oil, and adjusted to complete a circuit between the points 50 and 51 when the parts are cold, and break said circuit when the warming of the parts has caused the non-conducting portion 53 to rise to a position between said points 50 and 51, as shown in said Fig. 9, this device to be located in proper relation to the burner to be affected by the heat thereof when lighted.

I do not limit myself to the mechanism shown in Figs. 1, 2, 3, 4, and 5, to obtain a retarded completion of the circuit in the wires of the annunciator or electrically-actuated gas supplying valve before referred to, as it may be accomplished in other ways, two of which I herein illustrate and describe.

In the construction illustrated by Figs. 6 and 7, the temperature-actuated mechanism adjacent to the burner and the wire I are similar to those shown in Fig. 1, but the retardation of the valve-actuated circuit closing mechanism is obtained as follows:—When the gas is turned on, the valve 1 carries the cam 2 attached thereto into substantially the position shown in Fig. 7. The spring 3 at the point of contact with the cam 2 is thus forced to the left, and the spring is put under tension, which is only relieved as the slotted end of the spring which serves to actuate the spiral shaft 4 of the gear 5 travels to the left also. The speed of revolution of spiral shaft 4 and gear 5 is controlled by the gears 6, 7, 8, 9, 10, escape wheel 11, and escape lever 12, acting in the well-known manner to check the normal tendency of the escape wheel 11. The spring 3 in its effort to relieve its tension imparts a rotary motion to the spiral shaft, and retarded thereby slowly approaches the contact point of the wire S^2, reaching which the circuit is completed and the annunciator bell or gas supplying valve is actuated as before mentioned, unless in the meantime the thermostatic circuit breaker has been operated in the manner described, to break the circuit. When the gas is turned off, the operation is reversed. The train of gears and the escapement are mounted in a suitable case, not shown.

The form of construction illustrated by Fig. 8 is put in operation as follows: The temperature-actuated mechanism adjacent to the burner is similar to that employed in the forms of construction before described. To the cock 20 is fastened the arc-shaped wiper 21, which is in substantially the position shown by dotted lines in said Fig. 8, and out of contact with the insulated point 22 when the gas is turned off, but is in contact (as shown in solid lines) when the gas is turned on. This at once completes the circuit of the current of electricity emanating from battery 23 or its equivalent, and causes motor 24 to start and set in motion the train of gears engaged therewith. Pivoted at 25 to the plate 26 is the lever 27, to which is pivoted at 28 the arc-shaped contact point 29. When the current is on, the end 30 of lever 27 is magnetically attracted to the field magnet 31, thus producing sufficient friction between the arc portion 32 of contact point 29 and the smooth circular hub 34 of gear 35, to cause said contact point to be carried upwardly from the position shown by dotted lines to that shown by solid lines and into contact with insulated contact point 33, as said gear 35 and its hub 34 are rotated by the action of the motor in the direction indicated by the arrow. When the current is off, the magnetic action ceases at 30, the friction between arc 32 and hub 34 is relieved, and the contact point 29 falls by gravity away from contact with point 33, and the current which operates the annunciator bell or the gas supplying valve is broken and their operation ceases. In this form of construction it will be seen that two distinct electric currents are employed, the one used in connection with the gas burner and cock serving only to run the motor and thereby make a retarded contact between points 29 and 33 of the wires S^2 and I, which convey another and independent current to the annunciator bell or gas supplying valve before mentioned, unless the motor has been stopped and contact point 29 allowed to drop back again, by the breaking of the circuit at J, near the burner, by the increased temperature at that point caused by lighting the gas.

In all of the forms of construction described, it will be seen that ample time can be allowed for the gas to be properly lighted or turned off without ringing an alarm or shutting off the main supply of gas.

In each of the embodiments of my invention here shown, the mechanism set for action or put in operation by the opening of the gas cock may be for convenience termed a motor, which actuates the circuit closer with a retarded motion.

I believe myself to be the first to combine with a gas burner and its cock a retarded safety device made operative by the opening

of the cock, and a heat-actuated device whereby the operation of the retarded safety device is prevented when the gas has been properly lighted. Hence I desire to cover as broadly as possible, within legal bounds, any retarded safety device the operation of which is made possible by the opening of a gas cock and impossible by the heat of the flame at the burner supplied by said cock, so that if the gas is turned on without being lighted the retarded safety device will operate after the expiration of a predetermined period, and in case the gas was properly lighted the retarded safety device will be prevented from operating. Said retarded safety device may be an alarm or a cock-closing mechanism as already stated, or any other appliance the effect of which is to obviate or guard against the dangers of escaping gas. For example, the safety appliance may be an electric motor included in a circuit which is closed by the opening of the cock and operates after a suitable period to close the cock and shut off the gas, unless prevented from so operating by the heat-actuated device at the burner in case the gas were lighted when turned on. The heat-actuated device may prevent the operation of the said motor by breaking the circuit before it has had time to shut off the gas.

I claim—

1. The combination with a gas burner and its cock, of a safety device made operative by the opening of the cock, means for retarding the operation of said safety device, and a heat actuated device whereby the operation of the said safety device is prevented when the gas is burning.

2. The combination with a gas burner and its cock of a retarded electric circuit closer made operative by the opening of the cock, and a heat actuated device whereby the operation of said circuit closer is nullified when the gas is burning.

3. The combination with a gas burner and its cock, of an electric circuit, a retarded circuit closer made operative by the opening of the cock, and a thermostatic circuit breaker adapted to be operated by the heat of the gas flame at said burner, and to nullify the action of the circuit closer.

4. The combination with a gas burner and its cock, of an electric circuit, a movable circuit closer, a motor for said circuit closer adapted to be set for action by the opening of the cock, said motor having means for retarding the movement of the circuit closer, and a heat actuated nullifying device adapted to be operated by the heat of the flame at the burner.

5. The combination with a gas fixture of a movable electric circuit closer, a movable guide or tube pivotally connected to the fixture and adapted to oscillate thereon, said guide directing the movements of said circuit closer, and connections between said guide and the gas cock whereby the guide is caused by the opening of the cock to direct the circuit closer to its circuit closing position.

6. The combination with a gas fixture of a bracket attached to said fixture, a crank shaft journaled in said bracket, a clamp or holder affixed to said shaft, a tube secured to said clamp, and having contact points at one end included in an electric circuit, a gravitating circuit closer in said tube, and connections between the crank shaft and the gas cock through which the tube is moved by the movements of the cock, the tube being provided with means for retarding the gravitating motion of the circuit closer, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 17th day of January, A. D. 1894.

HENRY H. CUMMINGS.

Witnesses:

E. BATCHELDER,

A. D. HARRISON.