(No Model.)

A. M. GRANGER.

FIRE EXTINGUISHING APPARATUS.

No. 260,192. Patented June 27, 1882.

Fig. 1.

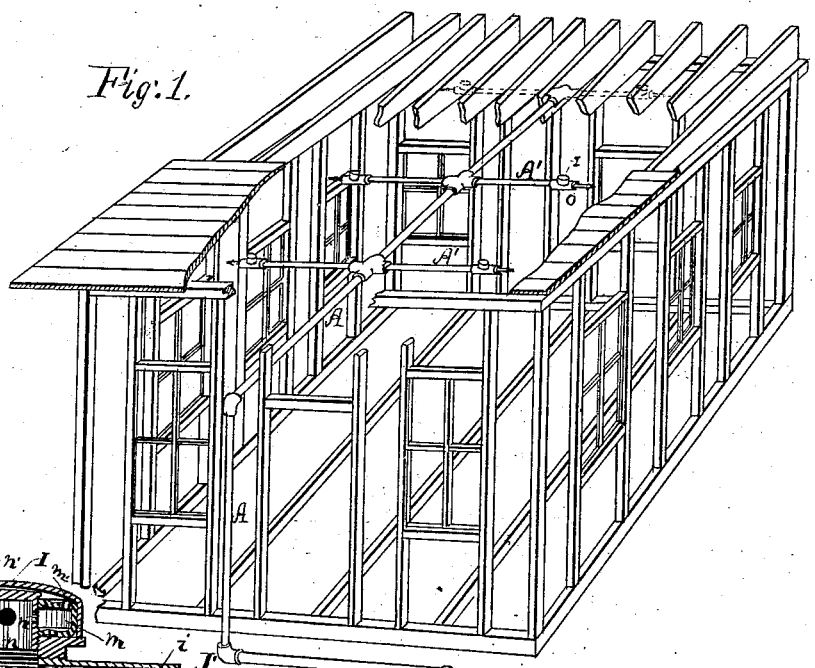


Fig. 4.

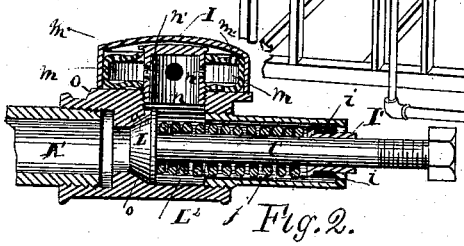


Fig. 2.

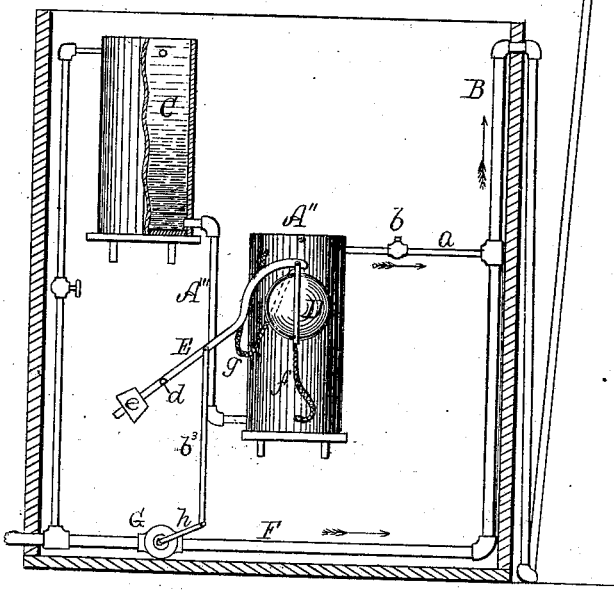
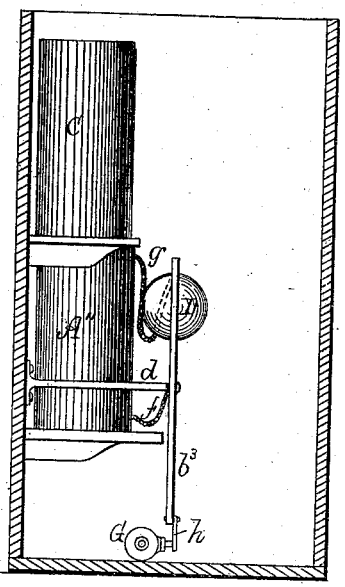


Fig. 3.



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FIRE-EXTINGUISHING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 260,192, dated June 27, 1882.

Application filed February 1, 1882. (No model.)

To all whom it may concern:

Be it known that I, ALMON MITCHELL GRANGER, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Fire-Extinguishing Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention has reference to a system of extinguishing fires in an apartment or series of apartments in which a series of water-pipes connecting with a suitable water-supply under head are distributed about such apartment or apartments, and are provided with outlets which under normal conditions are closed under some one of several methods by a metal of such fusible properties as to melt at a degree of heat which would endanger the safety of the structure, and thereby permit of escape into the apartments through such pipes of water from the original source.

The drawings accompanying and making part of this specification represent in Figure 1 a perspective view of the frame of a building containing my improvements; Fig. 2, a front elevation of the valve arrangement, and Fig. 3 an end elevation of same. Fig. 4 represents a detail sectional view, enlarged, of one of the nozzles or caps at the ends of the branch pipes and the fusible collars therein.

I have represented in these drawings the frame-work of a structure to protect which a fire-extinguishing apparatus is applied, and throughout which extends a system of main and branch pipes, A A′, the outlets of the latter to be closed by some one of the methods now adopted for applying the fusible metal before alluded to, in order that in event of the temperature in the structure rising to such a degree the metal will fuse, and thereby open the outlets of the distributing-pipes.

A″ represents an upright tank or receiver, closed against the atmosphere, and capable of withstanding the requisite internal pressure, this receiver, when the apparatus is placed in position, being filled with carbonic-acid gas from a suitable generator. The receiver A″, moreover, is connected with the water-distributing pipe B by a branch, *a*, and this branch contains a check-valve, *b*, closing inward, to exclude from the receiver A″ the water flowing through the distributing-pipes, set free by the fusion of the sealing plugs or valves of the latter.

To obtain the desired pressure wherewith to expel the gas from the receiver A″ into and through the circulating system of pipes B, I employ a tank, C, to contain water, the capacity of this tank and its elevation above the receiver being such as practice shall determine essential for the purpose. The tank C is to be supplied with water as occasion requires by a feed-pipe, a^3, and communicates at bottom with the bottom of the receiver A″ by a pipe, A‴, and the pressure of gas in said receiver is to be such as, until released, to overcome the pressure of water in the tank C and prevent flow of water from the latter to itself. The tank C is to be supplied with a vent connecting it with the atmosphere.

Ordinarily three or four pounds pressure within the receiver A″ will be ample to expel the caps or open the valves which cover the outlets of the distributing-pipes upon fusion of the metal which confines such caps or valves in place, and this pressure will of course suffice, also, to expel from the receiver and through the system of circulating-pipes the gas contained in such receiver upon the fusion of the fusible metal. Under normal conditions the gas-reservoir A″ is in uninterrupted communication with the distributing-pipes, which makes good any slight leakage in the latter, and which also maintains a pressure sufficient to hold back the water from entering such pipes, either by direct opposition, pressure for pressure, or by omitting to exercise any action upon the supply-valve until the event of considerable diminution in pressure in said distributing-pipes.

As before stated, my present invention is adapted to hold back from the distributing-pipes by direct action a supply of water under pressure seeking to enter such pipes, or to automatically open the valve which holds back such supply of water.

In the latter case a pressure of three or four pounds within the receiver A″ will suffice, as the check-valve *b* prevents entrance of water under pressure from the supply-pipe to said receiver; but in the former case the tank C must be at such an elevation and of such capacity as to supply a pressure superior to that of the said water-supply, or direct pressure of main supply, may be used, dispensing with tank C. I prefer using the tank C for reasons stated, and I have shown in the accompanying drawings one means of accomplishing the result, which consists in the employment of a hollow sphere or bulb, D, of any suitable material, capable of withstanding an internal pressure equal to that of the receiver A″, and I secure this bulb to the top of an upright bar or arm, E, inclined at a small angle from the perpendicular, such bar being pivoted at its lower part to an arm or horizontal stud, *d*, and at its lower extremity being provided with a weight, *e*, to counterpoise the weight of the bulb, when empty, of water, this counterpoise *e* being secured adjustably to the bar E, in order that its position may be changed, if necessary, to maintain the equilibrium of the said bar.

The interior of the bulb D communicates at bottom with the bottom or water-space *a′* of the gas reservoir or receiver A″ by a flexible pipe, *f*, while the top of such bulb is provided with a flexible pipe, *g*, which communicates with the upper part of the gas-space of said receiver.

The primary or delivery pipe which supplies the system of distributing-pipes A with water is shown in the drawings, at F, as extending beneath the counterpoised bar E and provided with a valve, G, whose stem carries an arm, *h*, which is pivoted to the lower end of a rod, b^3, the upper end of which is pivoted to the bar E.

The operation of the above-described apparatus is as follows, it being understood that the outlets of the distributing or showering pipes A are properly sealed by the fusible metal before named, the tank C filled with water, and the receiver A″ charged with carbonic-acid gas from the fountain. If the object is to allow the distributing-pipe to remain full of gas under pressure from the receiver, water being excluded from the distributing-pipes by the closed valve G, the arm *h* is to be connected with the rod b^3. Under these circumstances, if the fusible metal closing the outlets of the distributing-pipes becomes melted by undue heat, the gas within the system of pipes and the receiver A″, acted upon by the pressure of water in the tank C, is expelled from the latter and the bulb D into the distributing-pipe, at the same time driving before it into such apartment the gas standing in the distributing-pipes in advance of it. As the gas makes exit from the receiver A″ and bulb D the water from the tank C enters and takes its place, and in so doing fills the bulb or sphere D, thereby overcoming the equilibrium of the weight *e* and compelling the drop of the arm E, thereby lowering the arm *h* and opening the valve G and permitting water under pressure to flow through the pipes F and *d* into and through the pipes A A′, the check-valve *b* being closed by the influx of such column of water and excluding the latter from the receiver A″. Upon extinction of the fire and closing of the valve G, and the addition of new fusible metal to the outlets of the distributing-pipes, the pressure of the gas from the generator drives the water from the receiver A″ and bulb D back to the tank C and fills such receiver and bulb, in readiness to repeat the operation when occasion requires.

If it is desirable to employ only an apparatus which shall operate to allow the gas within the distributing-pipes under pressure from a receiver to hold back the supply of water from such pipes, the mechanical device hereinbefore described consisting of the gas-receiver and water-tank connecting therewith is to be dispensed with. The water-tank C is also to be dispensed with, and I employ simply the gas-receiver A″, supplied from a suitable generator, and I lead the main water-supply pipe F to and communicating with the bottom of the said receiver A″ and connect the upper part of such receiver with the distributing-pipes by an open pipe. Moreover, I place in the supply-pipe, in addition to the valve G, a check-valve closing outward to exclude the water from the receiver. Under these circumstances the pressure of gas in the receiver, under normal conditions, closes the check-valve and prevents entrance of water to such receiver, the valve G being open.

Should the temperature of the apartment or building be raised to the dangerous point, and the outlets of the distributing-pipes thereby opened, the pressure of the gas in the receiver and in the distributing-pipes falls below that of the water-supply, and such water opens the check-valve and flows into and through the receiver A″ and pipe *l* into the distributing-pipes, and is discharged from the latter, expelling gas before it into the apartment. When the fire has been extinguished the valve G is temporarily closed and entrance of water to the gas-receiver A″ thereby cut off, and the gas, under pressure from the generator, enters such distributing-pipes and flows through the latter into the apartment, expelling before it into such apartment the water contained in the receiver and pipes. The outlets of the distributing-pipes are now closed with fusible metal, and the pressure of gas in the receiver and distributing-pipes rises until it exceeds that of the water-supply, when the valve is opened.

The carbonic-acid gas, in addition to excluding water from the distributing-pipes, adds, as before stated, an important element to aid in extinguishing fires.

On the end of each branch pipe A′ is screwed

a shell or body, O, which has a valve-seat, *o*, formed in it to receive a conical valve, L, said valve being pressed against said seat by a spring, *j*. This rod extends through a bushing, I′, that has a flange on its rear end, which forms the forward abutment of said spring. The front end of said bushing extends through an opening in the front end of said casing. The flange is prevented from following by a ring, *i*, of fusible metal. When that metal melts the sleeve and stem will be forced out through said opening by the spring, and the valve L will move back through space L^2 within said body under the pressure of the escaping gas. The gas then passes up through said space L^2 and a passage, *n*, and thence through lateral openings *n′* to an annular space, *m*, provided with openings *m′*.

I is simply a loose cover, which is thrown off by the force of the escaping current. First the gas and then the water are ejected through the said apertures *m′*.

The construction and operation of this sprinkling device are fully set forth in my Patent No. 237,517, dated February 8, 1881, to which reference is hereby made. In my present case Fig. 1 shows the exterior of the nozzles or sprinklers illustrated more fully by Fig. 4, as above stated.

I claim as my invention, and desire to secure by Letters Patent of the United States, the following, to wit:

1. In apparatus for extinguishing fires, the combination of a pipe with a valve located therein, a lever weighted at one end, which normally closes said valve, and devices whereby the other end of said lever is caused to preponderate, substantially as described, when the carbonic-acid gas on one side of said valve is set free, in order that the valve may open and allow a flow of water through said pipe, substantially as set forth.

2. A lever having a weight at one end and a bulb at the other end, in combination with pipes for distributing fire-extinguishing material, a valve governed by said lever for controlling such distribution, and tubes for conducting water into said bulb when the counteracting pressure is released, substantially as and for the purpose set forth.

3. In apparatus for extinguishing fires, the combination of a receiver and a series of pipes for containing carbonic-acid gas under pressure, with a water-supply pipe connected therewith, a valve interposed between the gas and the water, a weighted lever and connections for holding said valve closed, and a hollow bulb attached to said lever and acting in opposition to said weight, said bulb being provided with pipes, whereby it is supplied with gas so long as the superior pressure of the gas excludes the water from said receiver, but is supplied with water when said pressure is relieved by the escape of the gas, the said bulb then overcoming the weight on the other end of the lever and opening the valve for the flow of water, substantially as set forth.

4. In apparatus for extinguishing fires, the combination of a water-tank with a gas-receiver, a main water-supply pipe, branch distributing-pipes, an offset pipe connecting the distributing-pipes with the receiver, and a valve in said offset pipe closing toward the receiver to exclude the main water-supply from the latter.

5. The combination of bulb D with lever E, from one end of which it is hung, weight *e*, operating on the other end of the lever, gas-receiver A″, pipes or tubes *f* and *g*, respectively connecting said bulb to the upper and the lower parts of said receiver, valve G and connections with said lever, and a tank, C, communicating with said receiver, whereby the influx of water into said receiver will fill said bulb and cause its connections to open said valve, substantially as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

ALMON MITCHELL GRANGER.

Witnesses:

H. E. LODGE,

F. G. SIMPSON.