(No Model.)

C. E. BUELL.

AUTOMATIC SPRINKLER AND SYSTEM.

No. 548,742. Patented Oct. 29, 1895.

Fig. 2.

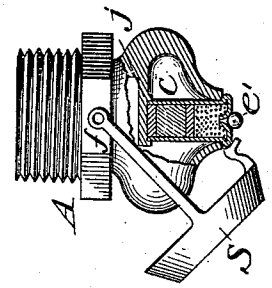

Fig. 1.

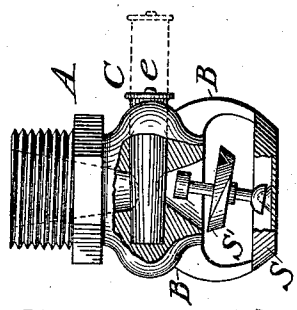

Fig. 3.

Witnesses:
J. W. Garfield
Joseph H. Buell

Inventor,
Charles E. Buell

UNITED STATES PATENT OFFICE.

CHARLES E. BUELL, OF NORTH PLAINFIELD, NEW JERSEY.

AUTOMATIC SPRINKLER AND SYSTEM.

SPECIFICATION forming part of Letters Patent No. 548,742, dated October 29, 1895.

Application filed July 23, 1890. Serial No. 359,698. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. BUELL, of North Plainfield, Somerset county, State of New Jersey, have invented Improvements in Automatic Sprinklers and Systems, of which the following is a specification.

My invention consists, primarily, in the combination, with a fire-extinguishing nozzle or device, of a seal closing an unobstructed outlet, said seal comprising a cartridge that is adapted to be dislodged and removed by heat, and a spreader for spreading the water delivered from the outlet thus opened, substantially as hereinafter described.

My invention further consists in the combination, with a system of pipes for distributing water through a building, of a series of sprinklers, each having an unobstructed outlet held normally closed by a seal that comprises a cartridge that is dislodged and removed by heat, and a water-controlling apparatus that is operated by explosions in said pipes, substantially as hereinafter described.

My invention further consists in the combination of the following-named elements, namely: a sprinkler-pipe, sprinklers connected to said pipe that open by heat, a water-supply pipe that comprises a siphon and a rising portion, a pressure-actuated mechanism operated by variations due to the action of heat, and a sectionally-charged pipe controlling the siphon, which is changed in its character by the pressure-actuated device, substantially as hereinafter described.

In the accompanying drawings, Figures 1 and 2 show details of my invention. Fig. 3 shows a system embodying my invention.

Fig. 1 shows a sprinkler having a water-way that is tapering to an enlarged portion. Between the tapering and the enlarged portion I insert a cartridge C in a manner to close the water-way. The cartridge C is inserted in a cavity in the side of the body of the sprinkler, and, having an enlarged outlet below the cavity, the water from the open sprinkler will not pass out of the said cavity. The cartridge C is composed of a shell of metal, paper, or glass, and the cartridge and the cavity are tapered, so that, while the shell can be fitted tight in the cavity, when an explosion has started the cartridge from its normal position it requires but a slight force to expel it from the sprinkler. To fit the cartridge C to its place and insure against a possibility of a drip, a layer of asphaltum may be placed as a coating on the water side of the cartridge where it is exposed in the tapering nozzle. The cartridge can be coated before insertion with a compound of paraffine and plumbago to insure against its adhering to the sides of the cavity by corrosion, or the shell be glazed or overlaid with a non-corrosive material, or the cavity and the shell can be made non-corrosive. The cartridge is preferably a copper shell charged with gunpowder and provided with a primer *e* of an easily-ignited substance or compound. In place of the spreader S′, resting on the pointed bearing of the cross-bar, I may employ the spreader S. Both are well-known forms, requiring no description.

Fig. 2 shows a sprinkler with an enlarged space above the nozzle, in which there is a projection *j*, with a cup-like portion and with a cartridge C inserted to close the outlet of the sprinkler and to enter the cup-like part of the projection *j*. By this arrangement the water-pressure is only on the sides of cartridge C and does not tend to expel the cartridges. The cartridge C is tapering toward its open end and is shown as provided with a sensitive primer *e*. The spreader S is to one side of the closed outlet, normally, and is pivoted at *f*, but is adapted to swing in front of the outlet when the cartridge C is expelled by heat. The cartridge C comprises a charge of gunpowder, two wads with an air-s] between them, and a primer consisting of a compound that is inflammable only when exposed to the air. The said compound is excluded from the air by the ball at *e′*, the said ball being soldered to the mouth of the pocket-like portion of the shell, that contains the compound that ignites at a low temperature in air, and thus fires the charge of powder. When a fire occurs in the vicinity of the sprinkler, the ball falls, exposing the primer, which ignites and generates a heat that fires the powder. A small orifice is shown between the pocket-like portion and the interior charge of the cartridge C; but it is not an essential that the flame of the ignited primer should come in contact with the powder, as the heat, penetrating through the copper shell, will fire the powder, which is already well

heated. There is an advantage in employing more than one explosive and inflammable substance in a cartridge, as any failure of one such substance will not defeat the object. A good form of cartridge is obtained by using a layer of fulminate of mercury between the powder and the inflammable compound mentioned, which is a phosphorous compound similar to match compounds, and can be varied in its igniting-point, and can have the air excluded therefrom by a varnish that will blister and be removed, by cements, and by gums, so that almost any desired temperature can be provided for.

By the term "cartridge," as used in the foregoing, I mean a suitable quantity of a material which contains within itself the elements of combustion or other chemical change, when acted upon by heat, for liberating mechanical energy and which will remain inert until it is so acted upon by heat, the said material being a compact mass or inclosed in a suitable shell and preferably consisting of solid matter.

Referring to Fig. 3, there is shown a system that consists of a tank J, from which extends a supply-pipe P P′ and a sprinkler-pipe, to which are connected the explosive-sprinklers Z Z. The supply-pipe is bent at P to form a siphon in the tank J and is bent again to form a rising portion at P′, after which it leads to the system of sprinklers to be supplied. From the tank J to the sprinklers there is no obstructing valve, and the water is excluded normally from the system, except in a section that includes the siphon and the rising portion. This is accomplished by a light pressure of air or gas, which flows in from the pipe P^4 and forces the water down in the siphon and forces it up in the rising portion, the water in these parts of a short section acting as a water seal for the pressure, that is prevented from exceeding a predetermined pressure by the safety-valve *sv*, which allows overpressure to escape. There is no pressure in the pipe or system except in that section between the siphon-bend at P and the rising bend at P′, so that there is no liability of leakage, as the limit of pressure is confined to a few feet, in which there need be no joints, and the pressure required to preserve the balance and prevent water from flowing into the sprinkler system need not be more than three pounds. To start the flow of water when a sprinkler opens requires simply to open a vent in the section where the air is under pressure. To accomplish this, I have provided a vent closed at g^2 by a glass and having a chamber, in which there is a ball *q*. In the pipe P′ P^2 there is a diaphragm-valve, with a lever L, which retains a hammer *w*′, which will, when released, fall and shatter the glass, and thus open the vent. To prevent the water from escaping at the opened vent, I place the ball *q*, of wood or hollow rubber, in the chamber, and this ball will float into the opening and close it at the proper moment. When the sprinklers Z Z, or either of them, open, the force of the explosion creates a pressure in the pipe P′ P^2 and lifts lever L, releasing the weight *w*′, which falls and breaks the glass *g*, as explained. A pressure-indicator I is provided to visibly indicate the condition of the system. A pipe P^3 from a source of water-supply under pressure is connected with the tank J to furnish a second water-supply, which is started automatically by the lowering of the water in tank J by means of the float-valve f^2 in a well-known manner. The siphon can be used with a system of soldered sprinklers by employing an air-pressure in the entire system, and by the opening of a sprinkler the water will flow to the system.

The apparatus, as shown, can be used with the soldered sprinklers and the valve controlling the weight *w*′ be operated by a separate pipe (shown in dotted lines) with explosive cartridges at *m m* to be operated by heat, or the small pipe may contain air or gas under pressure, and fusible vents at *m m* release the pressure when a fire occurs. In the same way a valve connected up by a reversal of the releasing device can be used with a vacuum in the pipe and fusible vents at *m m*.

The apparatus shown can be made operative by releasing the air-pressure in the charged section by an electromagnetic controlling device controlled by a thermal circuit to open a vent in a well-known way.

The advantage of a second seal or draft, in a siphon for sprinkler systems is that the evaporation of the water to nearly the level of the lower bend and below the highest point of draft of the siphon will not prevent the proper action of the siphon if it is filled and then held back by a light air-pressure in the system, while by the employment of such a construction an equation can be had between a column of water in the shorter bend and another in the upper portion which can be taken advantage of to prevent the forming of a siphon by a light air-pressure within the limited space between the two bends. By this arrangement the risk of a leakage is wholly removed of the air-pressure, a trouble that is always met with when the entire system of pipes is charged with air, and if an explosive-sprinkler is the form used, such as is disclosed herein, the filling of the system with water and the delivery of water from the open sprinkler is more quickly accomplished than by any known means, as the discharge of air-pressure from the limited space between the bends of the siphon will be accomplished very much quicker than from the entire system.

I do not claim herein, broadly, the generation of pressure in pipes by explosive energy for operating a turning-on mechanism or analogous mechanisms, as the same is covered in my co-pending application of earlier date

of filing—namely, my application of May 31, 1888, Serial No. 275,576.

What I claim is—

1. An automatic sprinkler having its outlet stoppered by a cartridge that comprises an explosive, and an easily ignited primer, that are excluded from the atmosphere that surrounds said sprinkler.

2. An automatic sprinkler having connections to a supply pipe, and having its waterway, or outlet, held normally stoppered by a cartridge, or its described equivalent, which has its contents excluded from the atmosphere which surrounds the said sprinkler, and that is in such relation to the said pipe as to generate pressure in said pipe when acted upon by the heat of a fire.

3. An automatic sprinkler having its waterway, or outlet, held closed by a cartridge stoppering the same, the said cartridge consisting of a shell containing an explosive, and removably secured in said outlet or water-way.

4. In a "dry pipe" system of automatic sprinklers the combination with an elevated tank of a riser which takes the form of a siphon the short arm of which is in open communication with the interior of the tank and the bend of which is below the level of the top of the fluid in the tank, and a number of sprinklers adapted to become open by heat, connected to said system, and the said system containing air under sufficient pressure to prevent the fluid rising up in the short arm of the siphon to the level of the bend thereof when the tank is filled to a level of the top of the bend while the said system remains hermetically sealed.

5. A system of automatic sprinklers, a tank elevated above the system, a siphon between said system and tank, and air contained under pressure in said system, substantially as described.

6. A system of automatic sprinklers, containing air under pressure a tank elevated above said system, a siphon between said system and said tank, and an automatically operated water supply connected with said tank.

7. The combination with a system of sprinklers of a tank that is located above said sprinklers and having connection therewith by a pipe that includes a siphon, and means for introducing a gaseous pressure into said pipe and means for supplying and replenishing said tank with water.

8. The combination with a system of sprinklers of a tank, or reservoir, located above said sprinklers, a pipe connecting said tank with said system that includes a siphon, means for discharging the pressure from said pipe by the action of heat, and means for introducing a gaseous pressure into said pipe.

9. A system of automatic sprinklers, a tank elevated above said system, a siphon between said system and said tank, air pressure in said system, and a regulator of air pressure connected to said system.

10. The combination with a system of sprinklers of a tank located above said system, a pipe connecting between said tank and system that includes a siphon that comprises two bends, a vent in said pipe that is held normally closed, a heat actuated release for opening said vent, and means for introducing a gaseous pressure into said pipe at a point between said two bends.

11. The combination with a system of sprinklers provided with a tank located above said system and connected therewith by a pipe that includes a siphon of a water supply pipe connected to said tank and provided with a valve that is actuated by the lowering of water in said tank, with means for introducing a gaseous pressure into said first named pipe.

12. The combination with a system of sprinklers of a tank of water located above the said system and connected therewith by a pipe that includes a siphon, means for introducing a gaseous pressure into said pipe, and a vent in said siphon that is opened by a thermal release which is independent of the sprinklers of said system.

CHARLES E. BUELL.

Witnesses:
A. C. BUELL,
W. C. BUELL.