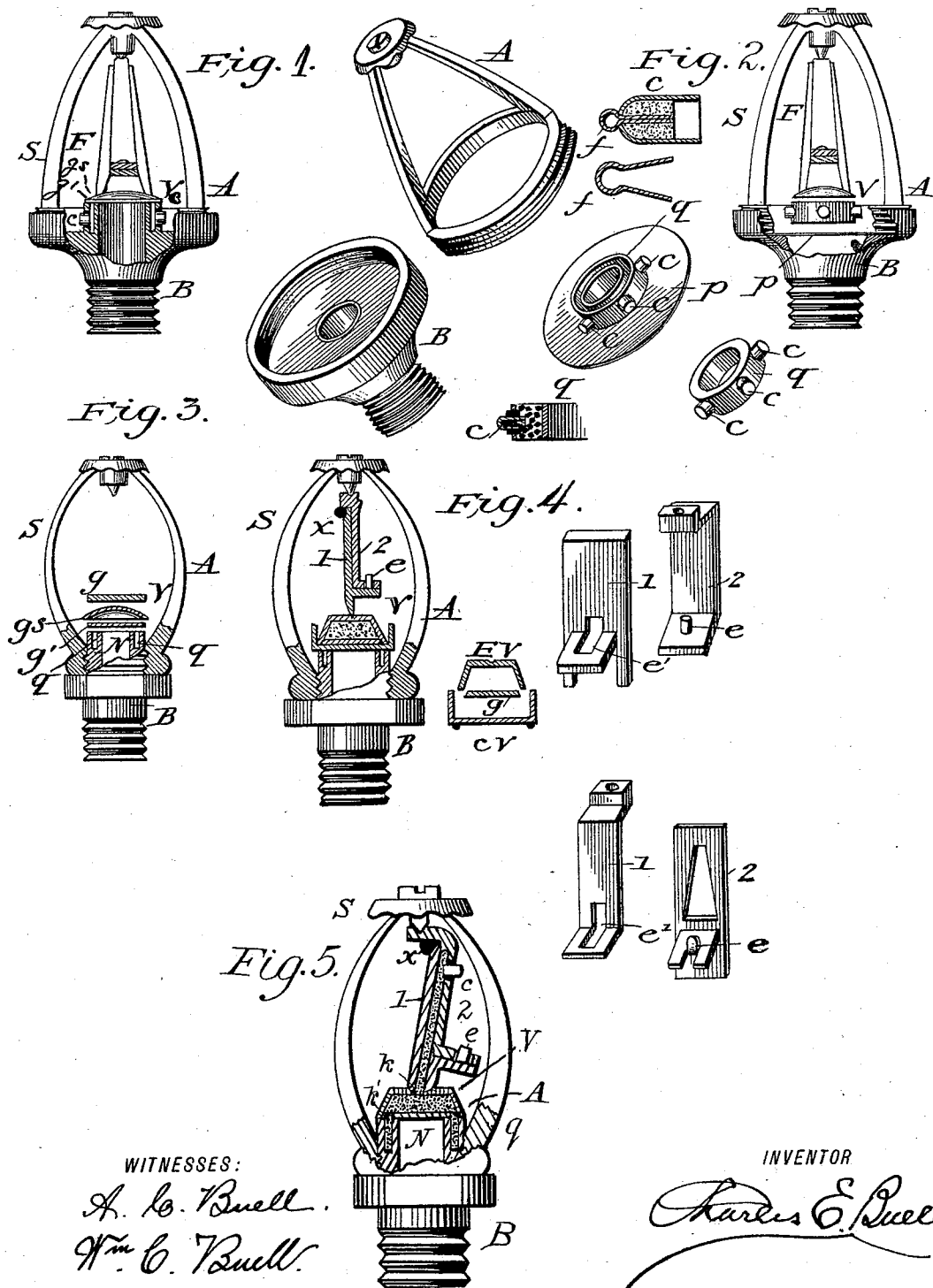


(No Model.)

C. E. BUELL.
AUTOMATIC SPRINKLER.

No. 582,897.

Patented May 18, 1897.



UNITED STATES PATENT OFFICE.

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AUTOMATIC SPRINKLER.

SPECIFICATION forming part of Letters Patent No. 582,897, dated May 18, 1897.

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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, of which the following is a specification.

It occurs that automatic sprinklers with fusible fastenings, if used in the vapors of a dye-house of a factory or in the bleach-room of a mill, are liable to be acted upon by the corrosive vapors and to have the valve and valve-seat and movable parts so firmly adhered together that the parts will not separate when the solder in the thermal release is subjected to a heat which would have caused the parts to separate when the device was new, and the sprinklers fail to open, and the object for which they were put in is defeated. It occurs that such sprinklers placed in shops in proximity to lines of shafting sometimes become spattered with oil, and the dried oil adheres the fusible and movable parts of the sprinkler so firmly that the device will not open properly when subjected to the heat of a fire which would have caused it to open if not so adhered. It also occurs that sprinklers depend upon an elastic portion to give a thrust to the movable parts at the instant of fusion, and this spring, if kept under tension for a long period, loses its quality of resiliency and fails to cause the parts to move when the solder has melted, as they would have done if the device was just made, notwithstanding slight pressure in the pipes or slight adhesion of the parts of the sprinkler which should become released and fall away. The result of these conditions and of others which are not now stated is that of the small percentage of sprinklers which are placed in buildings that actually become subjected to the heat of an incipient fire there is a noticeable percentage which have failed to properly open, and the object for which they were placed in buildings was defeated to a greater or less extent.

The object of my invention is to provide an automatic sprinkler which will avoid the danger of a failure to become open when subjected to the heat of a fire; and to this end my invention consists, primarily, of an automatic sprinkler having a thermal release normally holding its valve to the valve-seat and

adapted to become released by the action of heat and a charge of explosive material or of an expanding material that when acted upon by a temperature higher than that which would remove the thermal fastening when it is new will generate a pressure against the movable parts of the device and force the opening of the sprinkler, substantially as hereinafter described.

The further improvements in matters of detail will be hereinafter described.

In the accompanying drawings, Figures 1, 2, 3, 4, and 5 show sprinklers and details for carrying out my invention.

In Fig. 1 there is shown the sprinkler S, having the portion A, supporting the spreader, secured to the body B by being screwed therein. Around the nozzle from which the water is discharged is a groove filled with an explosive material, as a fulminate, or with gunpowder, and in the use of gunpowder primers *c c c c*, of thin copper, and charged with an easily-fired material, are set in the outer wall of the said groove *g* to fire the gunpowder at a lower temperature than it would otherwise be ignited. Over the groove thus charged is placed the valve V, and a fusible fastening F forces the valve to its seat when the assembled parts are subjected to the pressure caused by screwing the portion A into B. By having the fusible device soldered before applying it to the sprinkler the explosive can be introduced into the structure without the application of heat thereto at the time of assembling the parts, with advantages over an attempt to solder a valve over an outlet with a cavity surrounding the outlet and containing explosives. The valve V consists of the elastic top plate *g s* and a suitable gasket *g'*.

In Fig. 2 a sprinkler of like construction is shown with a flexible diaphragm *p* and a grooved portion *q* mounted thereon and charged as described. The grooved outlet is adapted to be placed upon the diaphragm of a sprinkler and held in place by the assembling of the parts of the sprinkler, or the said grooved part can be secured by solder or otherwise before it is charged, so as to be a part of the said diaphragm, as shown in the detailed views given. The elastic or flexible diaphragm thus formed sets into the body B and

is secured therein by the part A, admitting of an increased area of pressure beneath the said diaphragm for holding the valve-joint closed and to add to the thrust upon the assembled parts when the thermal release is acted upon by heat. The groove *g* is shown in enlarged detail, with the primer *c*, like a percussion-cap, insulated in the outer wall of the groove. An insulation of hard rubber, or even a layer of paint, can be employed to insulate the thin copper cap-like primer from the wall of the groove to accelerate the heating of the primer. To still further hasten the firing of the primers *c c c c*, I place a spring *f* in the contents of the primer. This spring *f* is compressed into the form shown in the detail drawings and is held in that form by an easily-fusible solder, which can be set to melt at a slightly higher temperature than the fusible fastening that supports the valve *V*, and which will, when melted, allow the spring *f* to suddenly expand within the primer, and by suddenly moving the mass of explosives when it is thus heated cause it to explode. By employing a mechanical force that is set in motion by heat at a desired temperature for suddenly disturbing, briskly compressing, and producing friction and shock in and upon the already-heated contents of the primer to cause it to be exploded and ignited before it otherwise would a more stable compound can be employed as a primer and the advantages of early firing be obtained without the disadvantages that attend the employment of the more-easily-fired compounds which deteriorate by age. A more stable compound can be employed in the primers and the said compound be made to explode earlier than it otherwise would do.

By the explosion of the primers *c c c c*, or either of them, the gunpowder or other explosive in the groove is fired and a pressure generated against the valve *V*, fastening *F*, and the said movable parts forced away from the sprinkler, if for any cause they should have failed to become released and removed at a lower temperature.

In Fig. 3 there is shown a sprinkler *S* with a groove *g* around the nozzle or outlet thereof which is filled with an easily-exploded compound. The valve *V* is shown to consist of a rigid plate *g*, an elastic curved plate or disk *g s*, and the gasket *g'*, interposed between the spring-plate *g s* and the nozzle *n*, containing the explosive charge. The portion *B*, comprising the nozzle *n*, with the groove *g*, containing the explosive charge, is adapted to screw into the portion *A*, which supports the spreader and which is screw-threaded to receive the part *B*. By making the sprinkler in this way the groove *g* can be formed in the nozzle *n* and be made in a more satisfactory way than could be done if the sprinkler was cast in one piece, as is customary to do.

By the employment of a valve containing a stiff spring, as *g s*, which becomes flattened

when the valve is forced to its seat a device is afforded which is more certain to open when the thermal fastening is released than those sprinklers that depend upon a spring as ordinarily constructed; but should the said spring fail to act properly and the sprinkler fail to open the explosive charge contained in the groove *g*, when acted upon by a slightly-higher temperature, will generate a pressure against the valve *V* and the support used to hold it to its seat and force the movable parts of the sprinkler away and cause the nozzle *n* to become uncovered and the sprinkler opened for the discharge of water.

Fig. 4 shows a sprinkler having a groove around the outlet thereof which contains an explosive material, a valve *V*, closing said outlet, which consists of a cup-like portion *s r*, having a piston *E V*, and upon the part like a piston the fusible fastening rests. The valve thus formed is adapted to expand when pressure is generated within it, and the said valve is intended to have contents that will be expanded by a temperature equal to or greater than that required to release the fusible fastening when the same is new, and the pressure, as of an easily-fired explosive, acting upon a valve of such construction tends to discharge the movable parts. If for any cause the sprinkler fails to open at the temperature for which it should act, an increase of a few degrees will cause the explosive contained in the groove *g* to ignite and generate a pressure that will force the valve and thermal release from the structure and open the sprinkler.

The fusible fastening shown is like the fusible fastening of my Patent No. 570,901, and consists of the upright member 1 and the supported member 2, pivoted thereon out of line with the longitudinal axis of the upright member and the two members secured by being soldered along their contacting surfaces. To further strengthen the strut thus formed, the deflected portion of one member is provided with a projection *e*, which registers with a slot in the other member at *e'*, and a mass of fusible material is interposed in the slot and between the said projection and the adhered member in front of the projection as it would move when the parts separate. A mass of solder can be added at the point *x* where the supported member pivots on the upright member, thereby further strengthening the strut.

In Fig. 5 there is shown a sprinkler *S*, constructed like those shown in Figs. 3 and 4 and described, but having its valve *V* filled with an explosive and a charge of explosive in the fusible fastening and a charge of explosive also in a groove *g* around the nozzle *n*, with a communicating passage at *k k'* between the charged strut and valve *V* and between the charge in valve *V* and the groove *g*. A primer is shown at *c* in the charged strut for hastening the explosion when the

contents of the cavities is of a not easily-ignited explosive material. The thermal release shown is a strut similar to the one shown in Fig. 4 and described, and this strut has a hole made in it, as shown, and the cavity thus formed filled with powder or other explosive, and the valve V is charged with a like charge, and upon failure to properly release under the action of heat the strut, valve, and contents of the groove *g* will be exploded and the sprinkler forced open.

What I claim is—

1. A sprinkler having an outlet-nozzle, a valve to close said nozzle that is constructed to normally open when not held closed, a support to retain said valve in closed position, means for automatically releasing said support by the action of heat, and an explosive which will be ignited at a temperature higher than that required to release said valve-support, and which is in position to force said valve open when ignited, whereby said valve will be automatically opened, if in its normal condition, upon the release of the support, or by the explosive, in case it is caused to adhere to its seat by corrosion or otherwise.

2. A sprinkler having a valve detachably and removably placed to cover its outlet, a fusible fastening holding said valve to its seat that is removed from the chill of the water in the sprinkler, a spring located in the valve-joint and adapted to give a thrust to the released valve and fastening, and an explosive material located in the valve-joint that is adapted to generate a pressure on said valve and fastening when acted upon by a temperature higher than that required to discharge the said fusible fastening when the same is new, and, a primer in communication with said explosive material.

3. A sprinkler having a valve detachably and removably placed to cover its outlet, a fusible fastening holding said valve to its seat that is removed from the chill of the water in said sprinkler, a spring located in the valve-joint and adapted to give a thrust to the released valve and fusible fastening, and an explosive material located in the valve-joint that is adapted to generate a pressure on said valve and fastening when the same is acted upon by a temperature higher than that required to discharge the said fusible fastening when the same is new.

4. A sprinkler having a valve detachably and removably placed to cover its outlet, a thermal release holding said valve to its seat that is removed from the chill of the water in the sprinkler, an annular groove surrounding the outlet, an explosive material in said groove that is adapted to generate a pressure against the said valve and release when acted upon by heat, a primer having communication with the said explosive material that is adapted to ignite at a temperature higher than that which is required to remove the said thermal release,

and a spring located in the valve-joint that is adapted to give a thrust to the released valve and thermal release.

5. A sprinkler having a valve detachably and removably placed to cover its outlet, a thermal release holding said valve to its seat that is removed from the chill of the water in the sprinkler, an expanding spring in the valve-joint that is exerting pressure against the valve of the sprinkler, a groove surrounding the outlet of said sprinkler that contains an explosive material that is adapted to generate a pressure against the movable parts of said sprinkler when acted upon by a temperature that is higher than would be required to discharge the thermal release when it is new.

6. A sprinkler having a valve detachably placed to cover its outlet, a fusible fastening holding said valve to its seat that is removed from the chill of the water in the sprinkler, a depressed spring located in the valve-joint, and an explosive material in the valve-joint that is adapted to generate pressure on the valve when acted on by a heat that is greater than would be required to discharge the fusible fastening when the same is new.

7. A sprinkler having a valve detachably placed to cover its outlet, a thermal release holding said valve to its seat, a spring located in the valve-joint, and adapted to give a thrust upon the released parts of the sprinkler, and an explosive material in the structure that is adapted to generate a pressure against the movable parts of the device when acted upon by heat that is higher than that required to remove the said thermal release when the same is new, substantially as described.

8. A sprinkler having a valve detachably placed to cover its outlet and held to its seat by a fusible fastening that is removed from the chill of the water in the sprinkler, a gasket between the valve and its seat, a spring in the structure for giving a thrust to the released parts, and, an explosive material in the structure and a primer in communication with said explosive material that is adapted to ignite at a temperature higher than that required to discharge the fusible fastening when the same is new.

9. A sprinkler having a detachable valve covering its outlet a fusible fastening forcing said valve to its seat that is removed from the chill of the water in the sprinkler, a spring for accelerating the movement of the released parts, and, an explosive material in the structure that is adapted to generate pressure against the movable parts when acted upon at a temperature higher than would be required to discharge the fusible fastening when the device is new.

10. A sprinkler having its valve held to its seat by an easily-fusible support that is located away from the chill of the water in the sprinkler, an expanding device that is adapted to give a thrust to the released support, an explosive material in the structure that is

adapted to generate a pressure on the movable parts of the device, and one or more primers in communication with said explosive material that are adapted to ignite at a temperature higher than that required to discharge said fusible support when the same is new.

11. A sprinkler having a valve detachably covering its outlet a fusible fastening holding said valve to its seat that is removed from the chill of water in the sprinkler, a lever mechanism comprised in said fusible fastening, a spring in the structure adapted to give a thrust upon the released fastening, a groove surrounding the outlet that contains an explosive material, and a primer, or primers, in communication with said explosive material that are adapted to ignite at a temperature higher than that required to discharge the said fusible fastening.

12. A sprinkler having a detachable valve covering its outlet, a support for said valve that comprises a fusible fastening, an expanding device in the structure for giving a thrust to the released fusible fastening, and an explosive material in the structure of the sprinkler for generating a pressure against the valve when acted upon by a temperature higher than that required to discharge the fusible fastening.

13. A sprinkler having a discharge-opening normally closed by a valve removably and detachably placed over said opening and held to its seat by a fusible fastening that is removed from the chill of the water in the sprinkler, and, an independent device included in the structure of the said sprinkler that is adapted to generate pressure for forcing open said sprinkler when the same is subjected to a temperature higher than that required to melt said fusible fastening.

14. A sprinkler having a discharge-opening normally closed by a valve detachably placed over said opening and held to its seat by a fusible fastening that is removed from the chill of the water in the sprinkler, a spring for giving a thrust to the released fusible fastening, and, an independent device included in the structure of said sprinkler that is adapted to generate a pressure for forcing open said sprinkler when the same is acted upon by a temperature higher than required to melt the fusible fastening.

15. A sprinkler having its discharge-opening closed by a valve that is held to its seat by a thermal release, a spring to give a thrust to the released thermal device, and an independent device in the structure of the sprinkler that is adapted to generate a pressure for forcing open the sprinkler when the same is subjected to a temperature higher than required to discharge the thermal release.

16. A sprinkler having its discharge-opening closed by a detachable valve normally held to its seat by a thermal release, an expanding device for giving a thrust to the movable parts when they are released, and

an independent device containing an explosive material adapted to generate a pressure for forcing open said sprinkler when the same is acted upon by a temperature higher than required to discharge the thermal release.

17. A two-part valve consisting of a cup-like portion and an inserted member and containing an explosive material in the structure thus formed.

18. A sprinkler having a valve held to its seat by a fusible fastening, explosive material in the structure that is adapted to generate pressure against the movable parts of the sprinkler when acted upon by heat, and a thermally-operated mechanism for producing shock and compression in and upon the explosive material when said mechanism is acted upon by a temperature higher than is required to discharge said fusible fastening.

19. A sprinkler having a valve held to close its outlet by a thermal fastening, an explosive material in the structure, a primer in communication with said explosive material, and a spring-actuated device that is held under tension by an easily-fusible substance, and adapted to discharge said primer when acted upon by heat higher than required to discharge said thermal fastening.

20. A sprinkler having its valve held to its seat by a fusible fastening, explosive material in the structure, a more-easily-fired primer in communication with said explosive material, and a heat-actuated mechanism for igniting and firing the said primer when acted upon by a temperature higher than that required to discharge the said fusible fastening.

21. A sprinkler having a valve held to close its outlet by a fusible fastening, an explosive material in the structure of the sprinkler that is adapted to generate a pressure on the said valve when acted upon by a heat that is greater than that required to discharge the fusible fastening, and a mechanism adapted to be actuated by heat for producing a shock for firing the said explosive material, substantially as described.

22. A sprinkler having a valve that is held to its seat by a fusible fastening, an explosive material in the structure for generating a pressure against said valve when acted upon by a temperature higher than that required to discharge said fusible fastening, and a primer for said explosive that comprises a mechanism that is actuated by heat to cause said explosive material to be ignited.

23. A sprinkler having a valve held to its seat by a fusible fastening, a charge of explosive material in the structure for generating a pressure against the valve, and a primer in communication with said explosive material that is adapted to be ignited at a temperature that is higher than what is required to discharge the fusible fastening.

24. A sprinkler that is normally closed by a valve that is held to its seat by a fusible fastening, an explosive material in the structure

that is adapted to generate a pressure for removing the said valve when acted upon by a temperature higher than that required to discharge the fusible fastening when the same
5 is new and a more-easily-ignited substance, as a primer, in communication with the said explosive material, and that is adapted to be

fired at a temperature higher than that required to discharge the fusible fastening.

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Witnesses:

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