No. 871,105. PATENTED NOV. 19, 1907.

C. E. BUELL.

AUTOMATIC SPRINKLER.

APPLICATION FILED MAY 18, 1897.

Fig. 5.

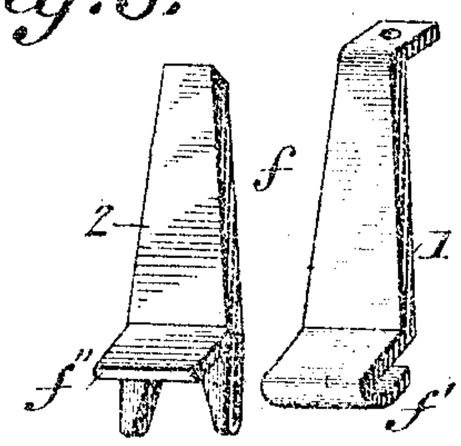


Fig. 5a.

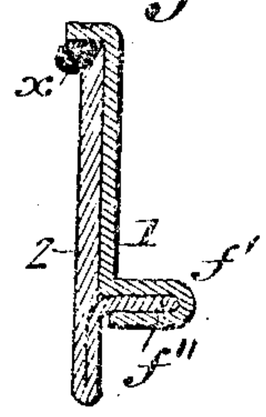


Fig. 6.

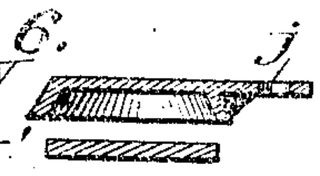


Fig. 6a.

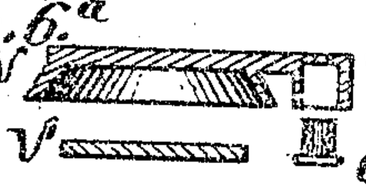


Fig. 7.

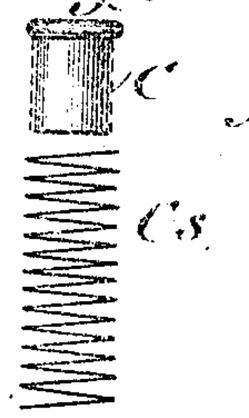


Fig. 4.

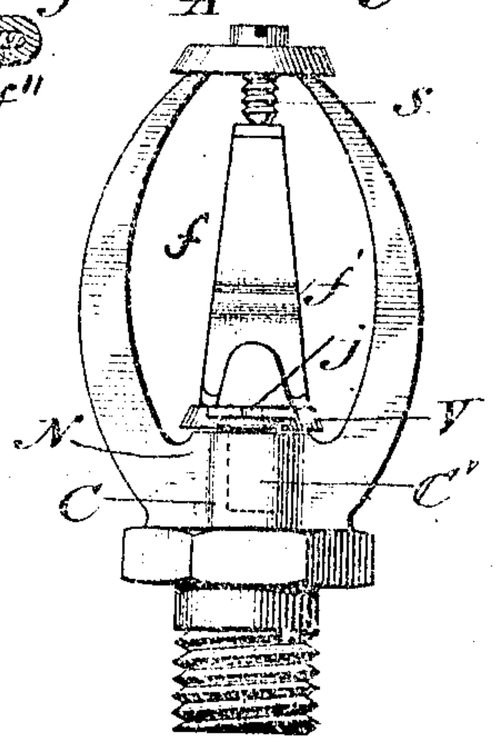


Fig. 1.

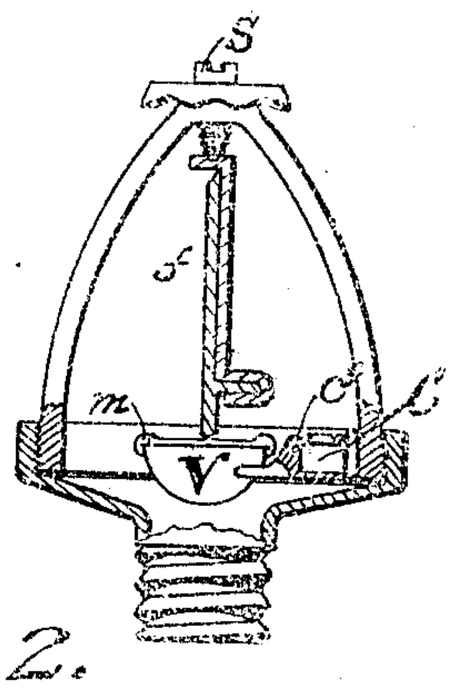


Fig. 8.

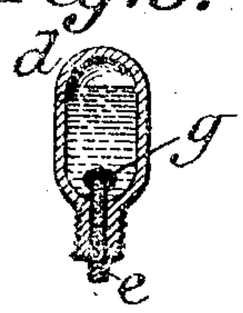
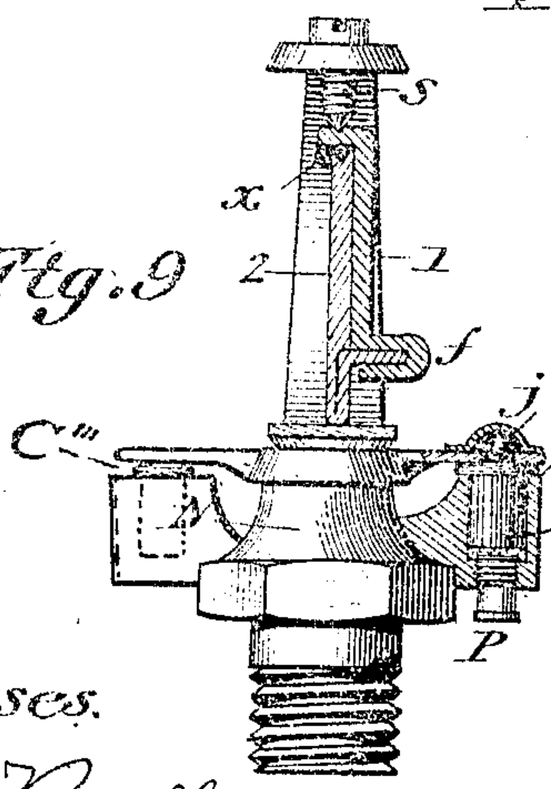


Fig. 3.

Fig. 2.

Fig. 9



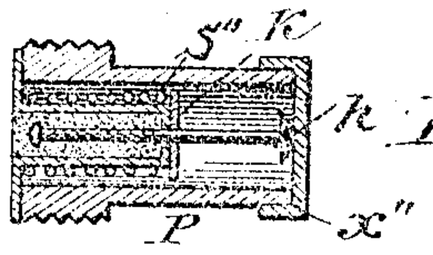


Fig. 10.

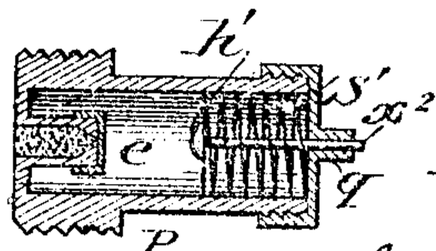


Fig. 11.

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UNITED STATES PATENT OFFICE.

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AUTOMATIC SPRINKLER.

No. 871,105. Specification of Letters Patent. Patented Nov. 19, 1907.

Application filed May 18, 1897. Serial No. 637,116.

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.

My invention consists, primarily, in the combination with a sprinkler of a valve provided with one or more projecting portions in operative relation to a heat actuated motor that is adapted to move the said valve when acted upon by the heat of a fire.

My invention further consists in the combination with a charge of explosive material in a fire extinguishing device, of a mechanism for igniting said explosive material; the said igniting member being adapted to be joined to the said charge as an independent member, all substantially as hereinafter described.

In the accompanying drawings Figure 1. shows an automatic sprinkler having a valve V. closing an outlet in a diaphragm, and held to its seat by a fusible fastening *f*. and a metal cap *m*. over the valve V. and beneath the fastening *f*. a screw S. for adjusting the pressure upon the assembled parts, and a cartridge holder C^f. containing a charge of explosive material C. therein that is adapted to be fired by a temperature greater than that required to melt and release the fusible fastening *f*. and when fired to force the valve V. from its seat, if, for any cause, it should have been adhered thereto, and not discharged when the fastening *f*. melts and releases the said valve V. Fig. 2. shows a cartridge holder C^f. as described, and Fig. 3. shows a modified form of such a cartridge holder C^f. Fig. 4. shows a sprinkler having its valve V. seated upon the nozzle N. Fig. 5 shows in perspective the two separated members of the strut. Fig. 5^a shows a vertical sectional view of the strut. Fig. 6 shows the valve V provided with the projecting member. Fig. 6^a shows a modification of valve V. Fig. 7. shows a cartridge C'. for use in said projection. Fig. 8. shows a primer mechanism for use in connection with the charge of explosive C. Fig. 9. shows a modified form of sprinkler having a primer mechanism in operative relation to the explosive charge. Fig. 10. shows a primer mechanism in sectional view for use with an explosive charge, and Fig. 11 shows a modification of the same.

Fig. 1. is a view in cross-section of a sprinkler with its valve V. seated upon a diaphragm, a metal follower on said valve a fusible fastening *f*. resting in said follower, and a screw S passing through the yoke, for adjusting pressure against said fastening. A cartridge holder C^f. containing a charge C. is located in the sprinkler in a manner to exert a lifting pressure against the valve V. when the charge in holder C^f. is fired by the action of heat.

Fig. 2. shows the cartridge holder C^f. as an independent member that is adapted to be inserted in the assembled structure of the sprinkler.

Fig. 3. shows a cartridge holder C^f. of modified form, for containing a charge C. of explosive, and adapted to be inserted in a sprinkler in operative relation to the valve V.; and when acted upon by heat to exert a lifting pressure against said valve V.

Fig. 4. shows a sprinkler having a nozzle N. closed by valve V. which is held to its seat by the fastening *f*. The valve V is provided with a hole *j* and the sprinkler body is provided with a projecting portion C' which contains a charge C.

Fig. 5 and 5^a shows the fusible fastening *f*. consisting of the member 1. supported upon the member 2. on which last named member there is a deflected portion *f''* and the pivoted member 1. is provided with a folded portion *f'* that is adapted to fit around the projection on member 2. and the two members thus disposed are soldered together with an easily fusible solder along their contacting surfaces. A drop of solder is also shown at *x*. where the supported member is pivoted on the supporting member.

Fig. 6. shows a valve V. having a projecting portion with a hole therethrough at *j*., and a gasket V'. to facilitate the formation of a proper joint between the valve and its seat. In the modified form of the valve V shown in Fig. 6^a. the projecting portion carries a cup-like part C' for receiving a cartridge C. The cartridge C. of Fig. 7. is fitted into a cavity in the body of the sprinkler, or in the inverted cup-like part of the projection

on the valve V., and together with it is a spring C^s. that fits with the cartridge C. in said cavity, or cup, and will give a pressure to the released movable parts of the sprinkler if the adhesion is not too great, but if the valve is not moved by the spring it will be when the explosive charge is fired by an increase of temperature.

There is a hole *j*. in the projection of valve V. and the primer mechanism shown in Fig. 8. is adapted to be inserted in the hole, and to stand upright by the side of the fastening *f*. The contents of the bulb *d*. consists of a tube *e*. filled with chlorate of potash and sugar entering into the bulb *d*., and its end covered with a protecting layer of paraffin *g*. and over this a quantity of sulfuric acid. The lower end of tube *e*. is adapted to enter into a cartridge C., or upon the copper shell which contains a primer of fulminate of mercury, and when fire heats the device thus arranged, the ignited charge in the tube *e*. sets off the charge in the cavity, or inverted cup, for generating pressure to lift the valve V. When the bulb thus arranged is used with a cartridge comprising a copper shell having a fulminate of mercury primer and a charge of gunpowder therein, the charge of chlorate of potash and sugar can be omitted, and the sulfuric acid be allowed to flow upon the copper over the fulminate, when the paraffin is melted at *g*., and by the heat which will be generated by the already heated acid acting upon the copper, the fulminate will be ignited, and the charge of explosive will be fired, exerting the desired pressure. When the action of acid upon the copper is desired the acid to be used is preferably nitric acid. The bulb is of glass, or lined with a non-corrodible material.

In Fig. 9. there is shown a modified form of the sprinkler shown in Figs. 1. and 4. and described. The valve V is seated upon the nozzle N. and has a projecting part, and the sprinkler is provided with an enlarged body portion in which is inserted a cartridge C. at C′. that is adapted to be fired by heat, and to lift against the projecting part of the valve V. for unseating the valve if it should be adhered when the fusible fastening *f*. is melted. The cartridge, or charge C. is a copper shell with a fulminate primer in the enlarged portion thereof, adapted to ignite at a temperature slightly above the boiling point of water. A hole in the projection on the valve is filled with an easily ignited compound that is in contact with the copper shell and takes fire by being exposed to a temperature that is slightly above normal, and when on fire causes the copper shell to be quickly heated and its contents fired, and thus is adapted to hasten the firing of the fulminate in the shell against which it is in contact. There is also a primer mechanism P. which is screwed into the enlarged part of the body of the sprinkler in a manner to be in communication with the explosive charge therein marked *e*., and this mechanism is adapted to be set to go off at a desired temperature for firing the lifting charge. When a paraffin seal is used, as in the bulb Fig. 8. the point of ignition is about 140° Fah. the employment of the mass of ignitible compound at *j*. can be 160° Fah. and the firing point of the primer mechanism P. can be at any desired point from 155° Fah. to 360° Fah., or even higher, if desired.

The primer mechanism P. is shown in detail in Figs. 10 and 11. In Fig. 10. the primer is a friction tube that consists of the fuse *e*. consisting of a tube containing a powder which will be fired by friction; in the powder contained in the tube is a wire, or plunger, carrying a cover for the tube, and beneath the cover on the wire, as shown, and surrounding the tube, is a compressed spring that is held compressed by the cover K. which is forced into the position shown, and held in such position by being soldered to the containing case, at x'' by an easily fused solder that can be made to melt at various degrees of temperature, and when melted will release the compressed spring S″, and suddenly raise the cover K. and attached friction plunger through the mass of friction powder in tube *e*. firing the powder, and igniting and firing the charge of explosives that is in communication with it. The primer mechanism thus constructed and arranged is adapted to be secured to the sprinkler after it has been placed in position, or has been received at the place where it is to be placed in use, with advantages over the shipment of sprinklers that have an easily fired primer, and a charge of explosive in the assembled sprinkler.

There are advantages in being able to provide a primer mechanism which can be held by solder; that can be set to go at a desired degree of temperature by varying the melting point of the retainer solder that is used.

The form of primer-mechanism shown in Fig. 11. consists of a percussion member *e*. with a spring hammer *h′* held in the position shown by the compressed spring S′. retained by being soldered at the point x^2. by the rod of the hammer passing through the cover at *q*. and being soldered therein.

A screwthreaded portion is shown on the exterior of the primer-mechanism P. shown in Figs. 10. and 11. by which means the device can be secured in a sprinkler, as described. There is shown in Fig. 9. a second projection on the valve over a second enlarged portion of the body of the sprinkler and a cartridge C‴ that contains an expanding substance which will exert a pressure beneath and against the valve V. when the sprinkler is subjected to the heat of a fire.

This can be used conjointly with the explosive charge shown and described, or may be used alone in a sprinkler thus constructed.

A sprinkler thus constructed and arranged can have a spring *i*. of metal, curved, as shown, placed above the valve V. for giving a thrust to the released parts. The action of the expanding material in the cartridge C''' has advantages over the use of a spring, as there is an increase of pressure against the valve V. with an increase of temperature, and, unlike a spring that is compressed, the condition of the expanding body is not changed by the lapse of time.

The primer-mechanism can involve the release of a liquid, or acid that will flow to act upon suitable material for causing an ignition, or the mechanism can depend for motion upon a fusible fastening that is normally held by a solder which, in its normal operation, releases a friction, or percussion exploder, and the mechanisms thus arranged can be secured upon a sprinkler, or other device, in communication with an explosive charge, as described. The firing mechanism thus organized is adapted to be secured upon the exterior of the sprinkler where it is readily reached by the heat of an incipient fire, and is detachably secured to the sprinkler.

The explosive charge can be further secured against failure to ignite at low temperatures, by mixing fragments of glass, and unequally expanding material, in the fulminate portion of the cartridge that is used, and by multiplying the means for the early firing of the explosive charge to secure against failure to produce the discharge.

By the employment of the frictional primer-mechanism the parts employed can be of lighter weight than when a percussion primer is used, and good results be obtained. The spring shown can be a compound spiral that at normal temperatures will not be under tension, but will be given a tension when heat acts thereon and causes the unequal expansion of the compound spiral to create tension therein.

What I claim, is:—

1. An automatic sprinkler having a valve closing its outlet, a fusible fastening for said valve, and a removable cartridge in an opening in said sprinkler body at one side of the valve and adapted to exert a tipping pressure on the valve when acted upon by heat, substantially as described.

2. An automatic sprinkler having a valve closing its outlet, a fusible fastening for said valve, a projection on the valve at one side thereof in operative relation to a thermally ignited charge, and a removable primer in operative relation to said thermally ignited charge, substantially as described.

3. An automatic sprinkler having its outlet held normally closed by a fusible fastening, a projection on the valve at one side thereof and in operative relation to a thermally ignited charge, and at the other side thereof a projection from the said valve to a thermally expanded charge, the said thermally ignited and expanded charges being adapted to exert pressure for lifting said valve when acted upon by heat, substantially as described.

4. A removable cartridge for an automatic sprinkler comprising a firing mechanism actuated by a spring which is held under tension by an easily fusible material, substantially as described.

5. A removable cartridge for an automatic sprinkler comprising a tube filled with powder, a friction plunger held in place in the bottom of said powder filled tube by a spring, said spring being held under tension by solder and the whole inclosed in a casing adapted to be secured to a sprinkler, substantially as described.

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WM. C. BUELL.