(Model.)

F. GRINNELL.

AUTOMATIC FIRE EXTINGUISHER.

No. 248,828. Patented Oct. 25, 1881.

Fig. 1.

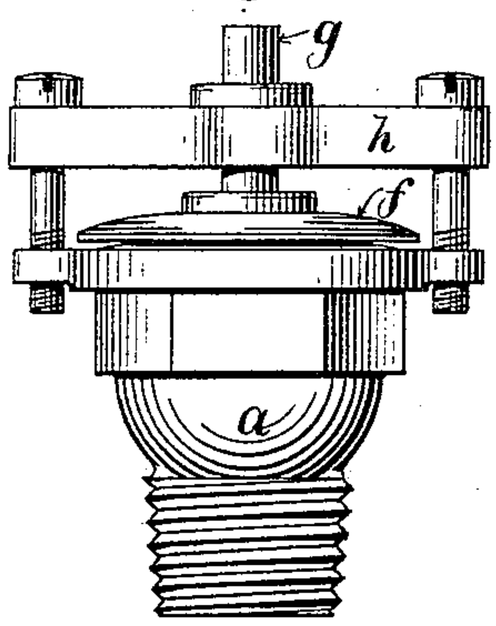


Fig. 2.

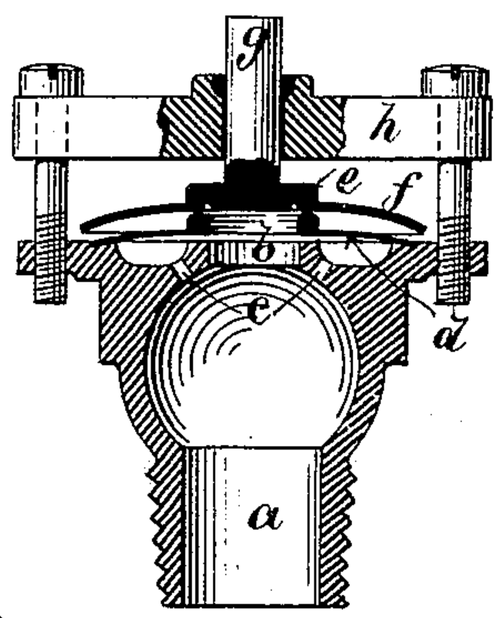


Fig. 3.

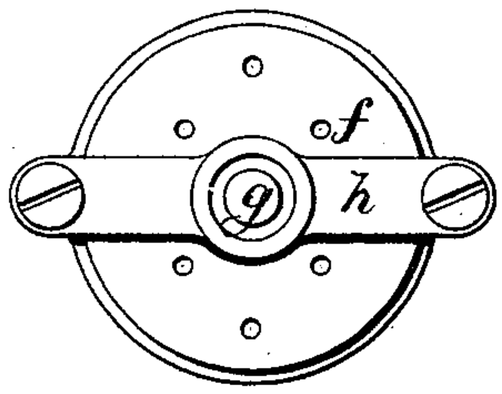


Fig. 4.

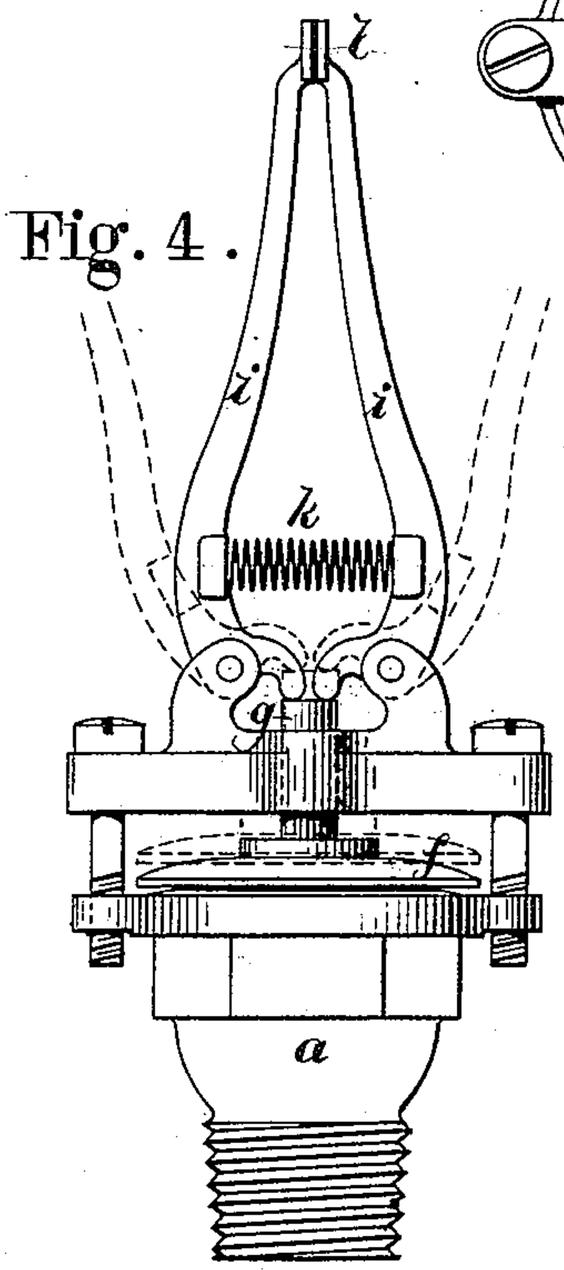
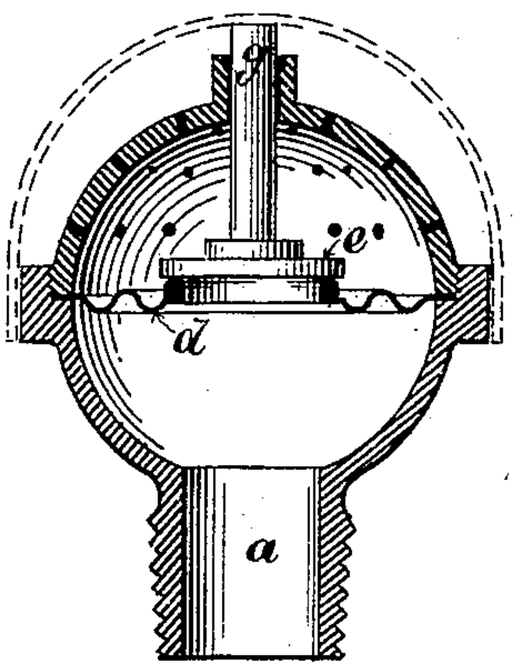


Fig. 5.



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FREDERICK GRINNELL, OF PROVIDENCE, RHODE ISLAND.

AUTOMATIC FIRE-EXTINGUISHER.

SPECIFICATION forming part of Letters Patent No. 248,828, dated October 25, 1881.

Application filed June 17, 1881. (Model.)

To all whom it may concern:

Be it known that I, FREDERICK GRINNELL, of the city and county of Providence, and State of Rhode Island, have invented a new and useful Improvement in Automatic Fire-Extinguishers; and I hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

This improvement has reference to that class of automatic fire-extinguishers in which a valve for controlling the flow of water or other fluid for the extinguishment of a fire in a building is held closed, until, by the effect of the heat of the fire upon the device or means which confines the valve, all restraint upon its opening is removed to allow the extinguishing-fluid to be discharged upon the fire.

The invention principally consists in the combination, with the devices, means, or instruments for keeping the valve of a fire-extinguisher closed, of a yielding diaphragm, which is subjected to the pressure of the confined water or other extinguishing-fluid, and which diaphragm, so soon as the solder or other fusible material which holds the valve shut is melted, will by its change of form, induced by the pressure of the fluid in advance of the opening of the valve, completely disrupt the fused solder-joint, and thereby prevent the solder from setting and obstructing the movement of the valve to a full opening, as it is liable to do if chilled by a jet of water.

My invention further consists in the employment of a deflector-plate for distributing the extinguishing-fluid radially, which plate is secured to and moves with the valve-cover.

Referring to the drawings illustrating my invention, I have shown by preference in the several figures that member of a valve which is called the "seat" mounted upon and attached to a yielding diaphragm, and consequently, when the cover of the valve is raised, the extinguishing-fluid will find a passage through the opening in the diaphragm so made. The inlet is shown at *a*, and the water or extinguishing-fluid employed is supposed to be under pressure. The outlet through the diaphragm, or the passage through the valve, is shown at *b*. The yielding diaphragm, preferably made from thin rolled brass or sheet-copper, is represented at *d*, and upon it is the valve-seat of the valve-cover *c*. The seat and the cover constitute together a well-known form of valve. The edge of the diaphragm is secured by solder to the case of the extinguisher, so that the joint will be water-tight. The pressure of the extinguishing-fluid when the valve is shut must be resisted by the diaphragm, and to enable the full pressure of the fluid to be exerted against its surface, passages *e* connect the interior of the inlet-pipe *a* with an annular channel underneath the diaphragm surrounding the neck of the outlet-passage *b*, as shown clearly at Fig. 2. The stem of the valve-cover is shown at *g*, and passes through a collar formed in the yoke *h*, connected to the case of the extinguisher, and a solder-connection between the exterior surface of the stem and the interior of the collar is to be supposed as made for the purpose of holding the valve shut until by the occurring of a fire in the building such solder is melted by the extreme heat of the atmosphere thereby occasioned.

To enable the extinguishing-fluid to be distributed radially in all directions, I employ a deflector, *f;* but instead of fixing it in a stationary plane I attach it to the cover of the valve, whereby I secure the advantage that when the valve is shut the deflector will stand in close proximity to the upper surface of the diaphragm, and present a much smaller space for the lodgment of the dust and lint floating in the atmosphere of the room in which the extinguisher is placed, and the accumulation of which upon the surface always impedes the distribution of the fluid when the valve is open.

Understanding, now, that the apparatus described is secured to one of the outlets of a system of pipes placed throughout a building to protect the same in case of a fire, and that such pipes contain water or other suitable fluid under pressure, the operation of the apparatus, in case of the occurrence of a fire sufficient to cause the fusible metal which holds the valve shut to be melted, is as follows: The tendency of the pressure of the fluid upon the yielding diaphragm is to distend it or spring it in the direction in which the pressure is applied. It

follows that so soon as the restraint upon the valve is removed both the valve-seat and the valve-cover will, in the arrangement of the parts shown in the drawings, move together to the extent to which the diaphragm is capable of yielding in advance of the opening of the valve. This movement, which is sudden, is sufficient in practice to break the solder joint, which is wholly or partially fused, so that the water subsquently escaping through the opened valve will not, by chilling the solder, be able to impede the full opening of the valve.

In the modification of structure shown at Fig. 4 the valve is held shut by the short arms of the levers *i i*, the longer arms being united by a material easily affected by heat, and by reason of the difference in the length of the arms of the levers a material—such as paraffine, wax, or other substance having but little cohesion or power of resistance—may be used to hold the levers and retain the valve shut. To facilitate the opening of the levers upon the fusion of the solder, a spring, *k*, may be used, but is not indispensable. In this arrangement (shown at Fig. 4) it is specially advantageous to mount the valve-seat upon the yielding diaphragm, for the reason that there is not the same convenience in accurately adjusting the cover of the valve to its seat preliminary to securing the valve against opening by means of a fusible solder as there is in the construction illustrated at Fig. 2. The pressure of the fluid, however, upon the diaphragm under all variations forces the seat against the cover, and enables by such pressure the seat to adjust itself to the plane occupied by the face of the cover. Again, with the arrangement shown at Fig. 4, when the extinguisher is put into action a very small extent of movement of the diaphragm in advance of the opening of the valve will impart a greatly increased extent of movement to the extremities of the long arms of the levers *i i*.

Various equivalent combinations of levers or other mechanical devices readily suggest themselves, which may be used to hold the valve shut, so that little additional resistance from a material fusible at a low temperature is required to effectually restrain the valve from opening until the conditions arise when the fire-extinguishing fluid is needed to be discharged.

I do not wish to confine myself to any of the means shown to restrain the opening of the valve, but intend to include all such devices or means as are known to the art of constructing fire-extinguishers, and any one best adapted to the conditions under which in any particular case the extinguisher is to be used. Any means or devices for holding the valve shut until from the effect of highly heating the atmosphere surrounding the extinguisher the valve is freed from restraint, if combined with a yielding diaphragm, the movement of or change of form of which, under the pressure of the extinguishing-fluid confined by it, is made available for disrupting the connection which previously held the valve shut, will be within this part of my invention. Neither do I wish to limit myself to locating the seat of the valve upon the diaphragm. It will be obvious to any skilled constructer of automatic fire-extinguishers, when the utility of employing the movement of the diaphragm from the effect of the pressure of the fluid confined by it to aid in breaking the solder-joint before the valve itself opens is understood, that the principle can be applied in various ways, and that a diaphragm without a valve opening through it can be used and its movement from the effect of the fluid-pressure be mechanically communicated to the valve-stem.

In Fig. 5 the diaphragm *d* is shown corrugated, and the valve is placed into a rose-sprinkler, where the stem may be secured by solder, as in the construction shown at Figs. 1 and 2; or, in place of this means of restraint, a cap (indicated by broken lines in Fig. 5) may envelop the perforated sprinkler and be secured to the extinguisher-case by solder. In the latter case the end of the stem *g* will bear against the under surface of the enveloping-cap, and the valve will be held closed so long as the cap remains secured.

I have in an application for another patent filed of even date with the application for this patent described and claimed a certain specific application of a yielding diaphragm for operating a valve. This specific construction of devices I do not therefore claim in this patent.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In an automatic fire-extinguisher, the combination, substantially as before set forth, of a diaphragm capable of yielding to the pressure of the fire-extinguishing fluid confined by it, and the means or devices, substantially as described, for keeping the fluid-discharge valve closed until the restraint which the same exert against the opening of the valve is removed by the action of heat.

2. The combination, substantially as before set forth, of the movable cover of the fire-extinguishing fluid-discharge valve and a deflector attached to and moving with such cover.

3. The combination, substantially as before set forth, of a diaphragm capable of yielding to the pressure of the fluid confined by it, a valve-seat attached to and forming a part of the yielding diaphragm, a valve-cover closing the opening in the seat, and against which the seat is forced by the fluid-pressure on the diaphragm, and levers, constructed as described, for keeping the valve closed until released by the action of heat.

FREDERICK GRINNELL.

Witnesses:
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WILLIAM L. COOP.