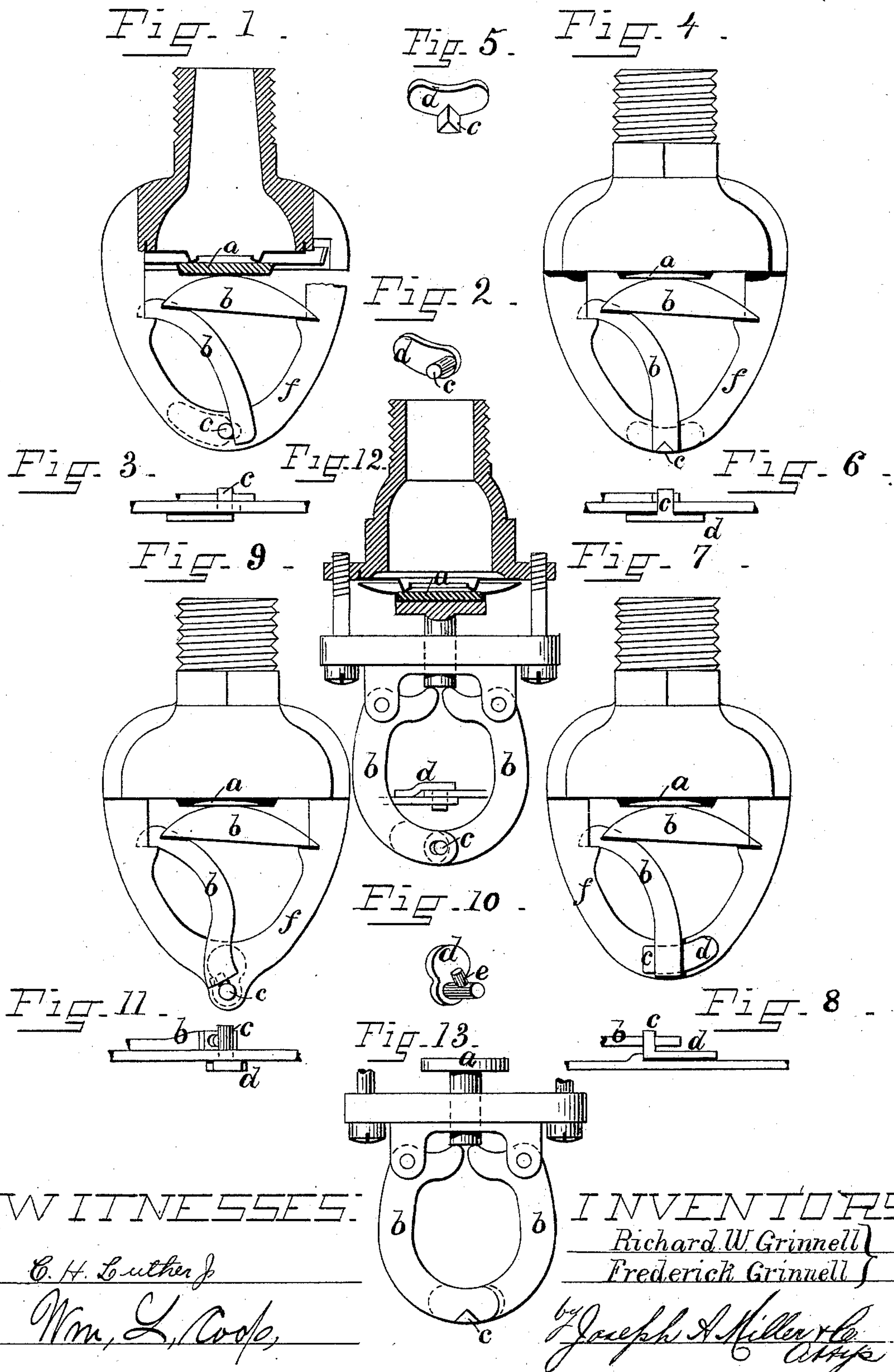


R. W. & F. GRINNELL.
AUTOMATIC FIRE EXTINGUISHER.

No. 277,481.

Patented May 15, 1883.



WITNESSES:

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(No Model.)

2 Sheets—Sheet 2.

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Fig. 14.

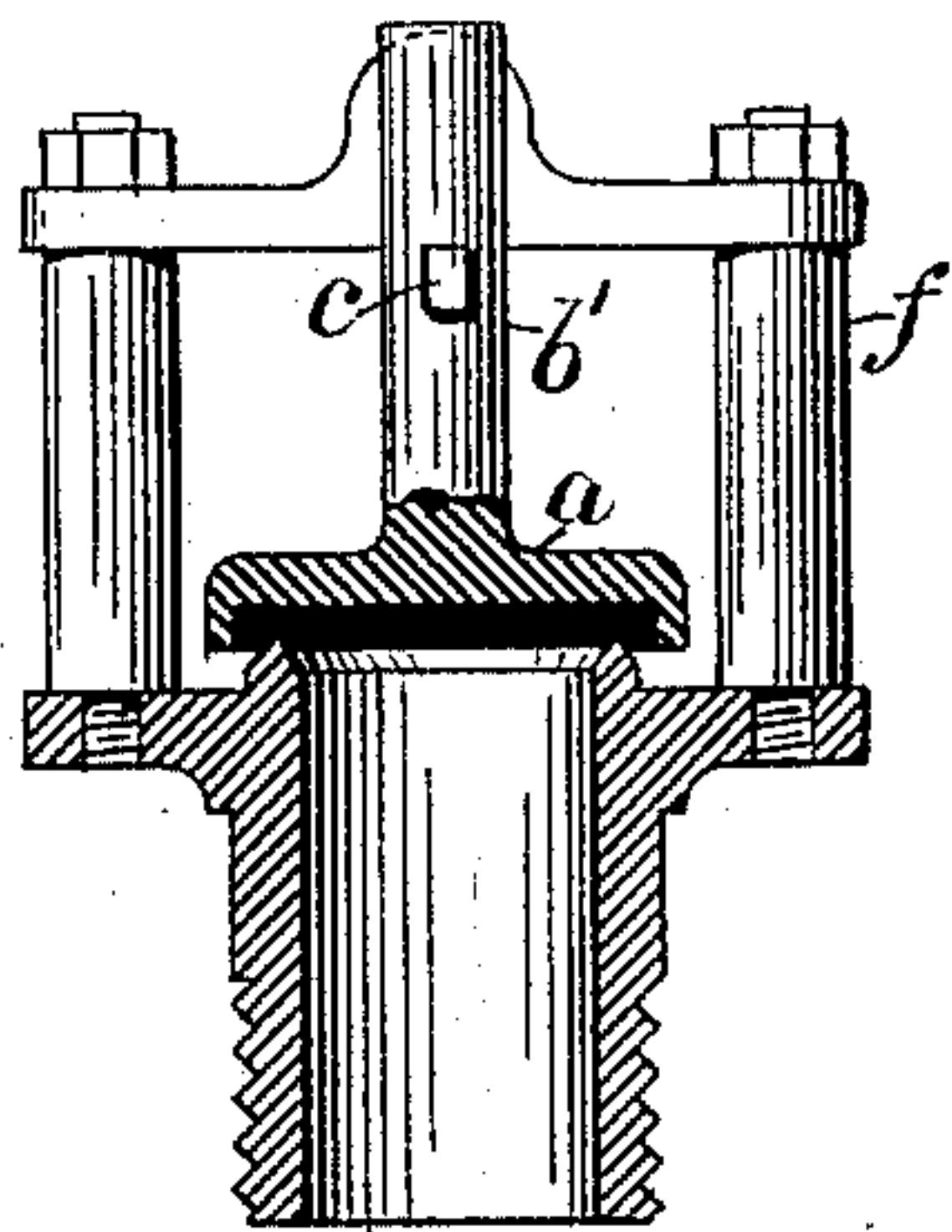


Fig. 15.

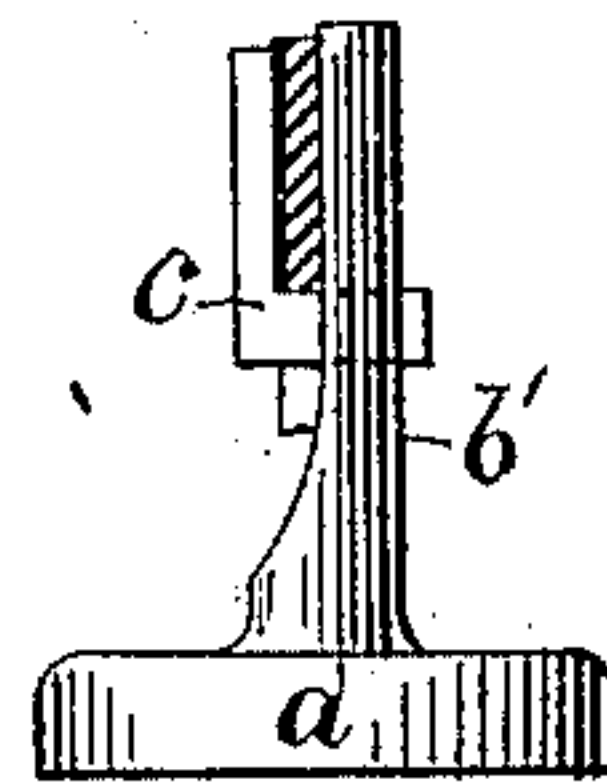


Fig. 16.

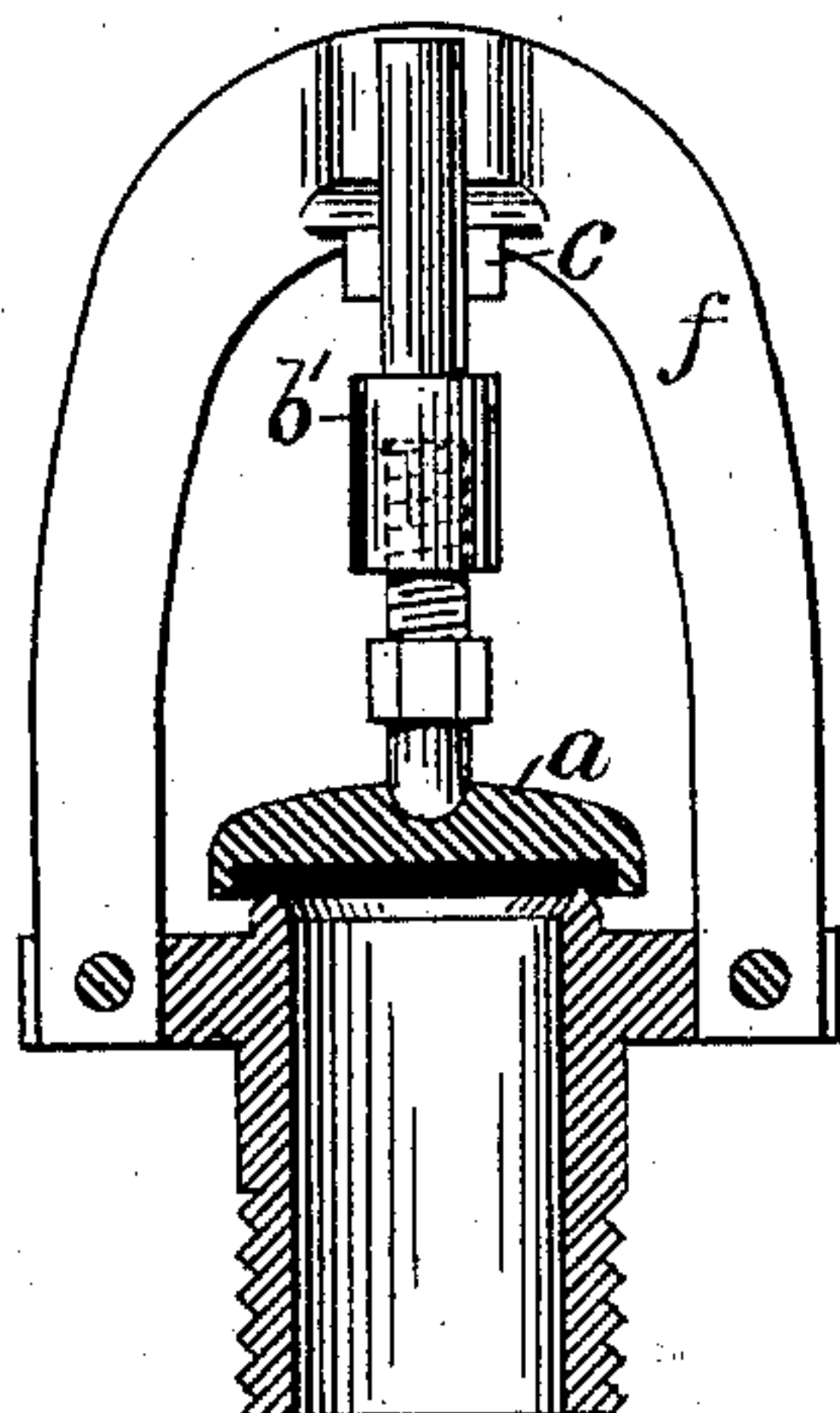
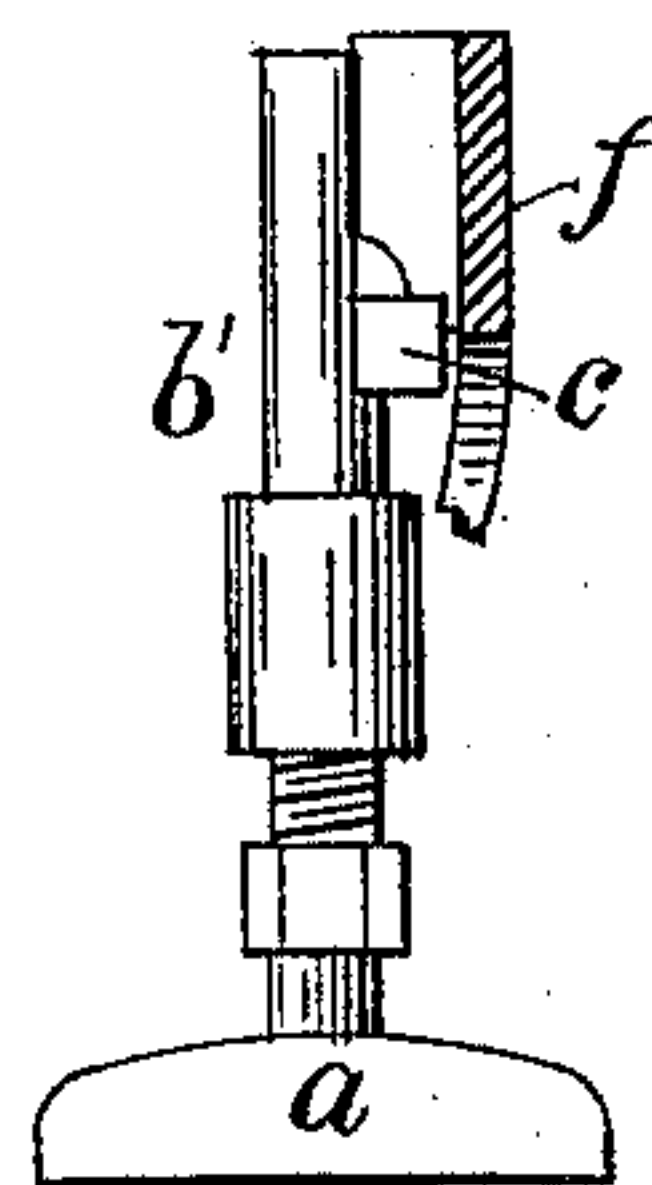


Fig. 17.



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UNITED STATES PATENT OFFICE.

RICHARD W. GRINNELL AND FREDERICK GRINNELL, OF PROVIDENCE, RHODE ISLAND; SAID RICHARD W. GRINNELL ASSIGNOR TO SAID FREDERICK GRINNELL.

AUTOMATIC FIRE-EXTINGUISHER.

SPECIFICATION forming part of Letters Patent No. 277,481, dated May 15, 1883.

Application filed January 22, 1883. (No model.)

To all whom it may concern:

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

In automatic fire-extinguishers of the various types and constructions the water or other fire-extinguishing fluid contained in the system of pipes distributed through a building is restrained by a valve, a seal, or a cap, by which the outlet is closed. These valves, seals, or caps are either directly secured by solder or are held by means of a stem, a lever, or other devices, so as to close the outlet, and these devices are held by a solder fusible at a low temperature, or a temperature below 200° Fahrenheit. The solder used for this purpose is liable to yield under the changes in pressure, is liable to deteriorate in time by chemical or molecular changes, so as to lose its original holding-power, and is most particularly liable to yield slowly when the temperature approaches the melting-point. Automatic fire-extinguishers are therefore liable to leak sufficiently to keep the solder cool at the most critical time, and thereby prevent the prompt action of the extinguisher. To prevent these difficulties, hold the outlet closed against all possible strain, and insure the prompt action of the automatic fire-extinguisher in case of fire are the objects of this invention.

The invention consists in interposing a metallic key between the device by which the valve or seal is held to the outlet and the fixed part to which it is secured, so as to resist the internal pressure by direct metallic contact.

Another part of this invention consists in so constructing or placing the key or metal locking device that when the solder becomes softened so as to yield the key will separate the parts and cause the sudden rupture of the soldered joint, as will be more fully set forth hereinafter.

Figure 1 is a view, partly in section, of

what is known as the "Grinnell Automatic Fire-Extinguisher." Fig. 2 is a perspective view of the key by which the lever holding the valve in place is secured. Fig. 3 is an end view of the lever and yoke, showing the key in place. Fig. 4 is another view of the same automatic fire-extinguisher and a triangular key by which the lever holding the valve is secured. Fig. 5 is a perspective view of the key; and Fig. 6, an end view, showing the key secured to hold the lever. Fig. 7 is another view of an automatic fire-extinguisher in which the lever is held by a key, and Fig. 8 is an enlarged view of the end of the lever and the key. Fig. 9 is a view of an automatic fire-extinguisher the lever of which is secured by a key. Fig. 10 is a perspective view of this key; and Fig. 11, an end view, showing the key secured to the yoke and holding the lever. Fig. 12 is a view, partly in section, of an automatic fire-extinguisher in which the valve is held to its seat by two levers, which are secured together by means of a key similar to the key shown in Fig. 2. Fig. 13 is a view of part of an automatic fire-extinguisher in which the valve is held by two levers secured together by a key like the one shown in Fig. 5. Fig. 14 is a view, partly in section, of an automatic fire-extinguisher in which the valve-stem is secured to the strut by means of a key soldered to the strut. Fig. 15 is a view of the same valve, showing the key soldered to the strut. The valve-stem may also be soldered to the strut. The key will, when the solder is weakened by heat, act as a pry to separate the weakened solder-joint. Fig. 16 is a view, partly in section, of an automatic fire-extinguisher in which a valve is held to its seat by a stem provided with a screw-connection, so that the valve can be forced firmly to its seat, the end of the stem being secured by solder to a yoke and a square key interposed between the stem and the yoke, as is more clearly shown in Fig. 17, which is a view of the valve and a sectional view of the yoke to which the stem is secured.

In all the devices shown, and in all other devices used to hold a valve, disk, seal, or deflector to the outlet, the levers or other devices holding the valve or seal may be secured to a

yoke, strut, or other fixed part of or connected with an automatic fire-extinguisher by one of the keys shown, or any metallic third part interposed to secure the same, which is secured
 5 by a fusible solder and constructed to be released by the action of heat when a fire occurs, and will release the part holding the valve or seal; or the levers may be so secured to each other. We prefer, however, to secure the device by which the valve or seal is held to the
 10 outlet to some fixed part by solder, and interpose a key or metallic lock between the parts, and construct the same so that the parts cannot move until the solder has become softened, and when the slightest movement takes place
 15 the interposed key will act as a pry to break the joint and force the parts asunder. Thus is secured great strength to resist the pressure, and a sudden, certain, and complete opening of the extinguisher.

In the drawings, *a a* are the valves. *b b* are levers acting on the valves to hold them against the seats to resist the internal pressure.

b' b' are valve-stems, by which the valve is held.

c c are the metal keys by which the levers and valve-stems or other devices for holding the valves are secured.

d d are arms or flanges formed on the keys, by which the same may be secured by solder, so as to retain their place until they are released by the action of heat.

The key shown in Figs. 1, 2, 3, 12, 14, and 15 consists in a round or square pin extending from the flange *d*. It is entered into slot-
 35 ted holes, so that it forms a metallic bearing against the end of the holes in each part as long as the flange *d* is held parallel to the parts, but allows them to separate as soon as
 40 the key is released. In separating the parts the key forms a pry, so that before the parts can slide along their surfaces they must separate—that is to say, no longitudinal motion is possible without a lateral motion separating
 45 the surfaces—or the devices holding the valve cannot move to allow even the slightest leak before the soldered joint is severed and the valve can open wide.

The key shown in Figs. 4, 5, and 6 is a triangular key, which enters a triangular groove in both the fixed part of the extinguisher and the device holding the valve. It is secured by solder and firmly holds the parts metal to metal until it is released by heat.

55 The key shown in Fig. 13 is like the key shown in Figs. 4, 5, and 6. It is placed into a groove formed in the two levers, which are secured together by solder.

The key shown in Figs. 9, 10, and 11 is a regular key, turning in a hole like the key of a lock. The ward enters the end of the lever or other device, and by it the valve may be forced to a firm bearing before the flange *d* is secured by solder. The lever *b* may also be secured in
 65 the fixed part by solder.

The key shown in Figs. 7 and 8 rests against a shoulder on the fixed part of the extinguisher,

and the lever *b* rests against the key, which, when released by heat, tips over and releases the lever or other device secured by the same. 70

The fixed part referred to is the yoke, strut, or other part, *f*, to which the valve or seal may be secured. Various forms of such fixed part are used in automatic fire-extinguishers, to which the devices holding the valve or seal are
 75 secured.

In all the various applications of the keys shown the levers and valve-stems are held by the keys, and the levers, whether secured by solder or not, cannot move until the key by
 80 which they are held is released, thus firmly securing the levers, and through them the valves, and preventing the possibility of a leak until the restraining parts are entirely released and the valve may open its entire width, thus in-
 85 suring the prompt and reliable action of the automatic fire-extinguisher, preventing leakage, and increasing the security against fire.

We do not claim the use of the keys, broadly, as these form the subject-matter of two other
 90 applications filed by us of even date herewith, and to which reference is hereby made.

It is obvious that in the class of automatic fire-extinguishers in which the valve is held to its seat by means of a spring, so as to form
 95 an elastic bearing against the internal pressure, the soldered joint by which the spring and the internal pressure on the valve are resisted may be locked by a key in the same manner as the joints shown and described in
 100 the specification. It is also obvious that in the examples shown in Figs. 14 and 16 the valve-stem may be separated from the valve-disk, and a coiled spring surrounding the valve-stem bearing against the valve-disk and against a
 105 truss formed on the upper end of the valve-stem may be used to secure a spring-pressed valve, which is entirely released by the release of the key holding the valve-stem. It is also obvious that the yokes *f f* shown in Figs. 14
 110 and 16 may be made so as to exert a spring-pressure on the valve. Such springs, having been used in previous inventions, form no part of this present invention, but may be used in connection with the various forms of keys. 115

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. In an automatic fire-extinguisher, the combination, with a valve or seal constructed to
 120 close the outlet, and the device by which the valve is held, of a key secured by solder and constructed to hold the device until the key is released by the action of heat, as described.

2. In an automatic fire-extinguisher, the combination, with a valve or seal constructed to
 125 close the outlet, and the device by which the valve is held, which device is secured by a solder fusible at a low temperature, of a key constructed to hold the device and cause the
 130 parts to separate when the solder is weakened by the action of heat, as described.

3. The combination, with the valve *a* and devices by which the valve is held to its seat,

of a metal key constructed to lock the devices, resist the pressure on the valve, and suddenly release the valve when the solder by which it is secured is fused by the action of heat, as described.

5 4. In an automatic fire-extinguisher, a soldered joint strengthened by a metal key constructed to rupture the joint when the solder is affected by heat and cause the prompt action
10 of the extinguisher, as described.

5. The combination, with the valve *a* of an

automatic fire-extinguisher and the fixed part *f*, of a device interposed between the valve and the fixed part, secured to the latter by a fusible solder, and the metal key *c*, placed between 15 the parts to resist strain and cause the soldered parts to separate, as described.

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Witnesses:

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