(No Model.)

F. GRAY.

FIRE EXTINGUISHER.

No. 307,456. Patented Nov. 4, 1884.

Fig. 1.

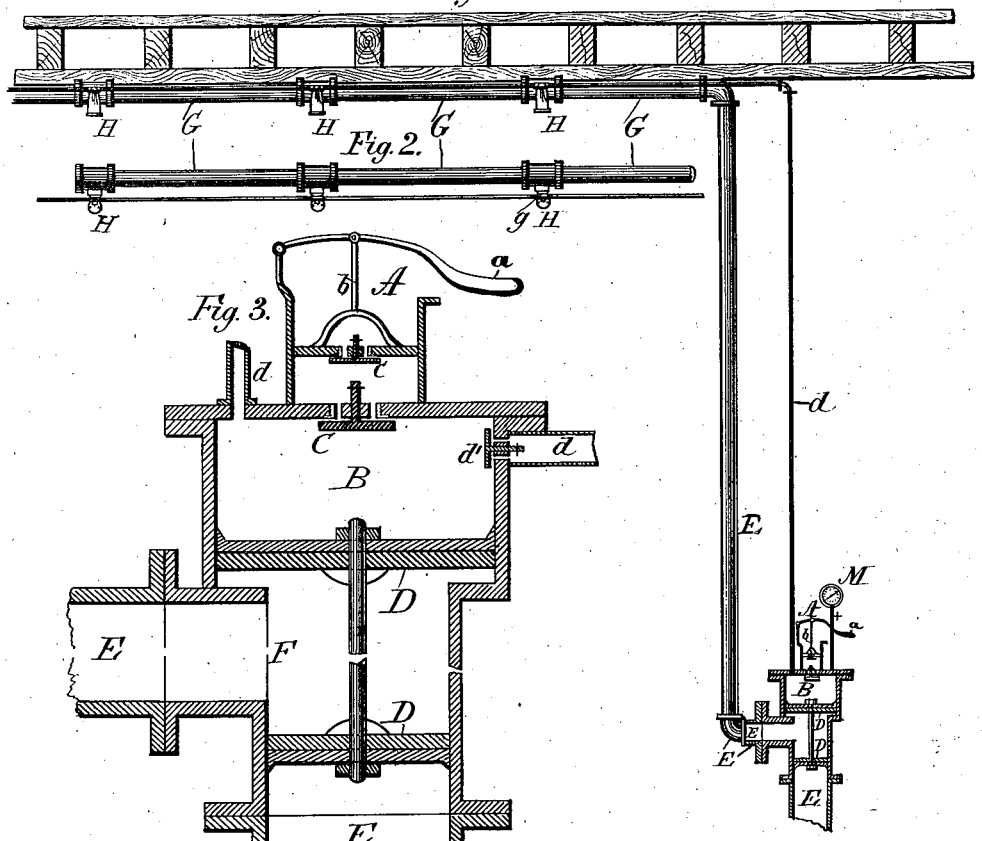


Fig. 2.

Fig. 3.

Fig. 4.

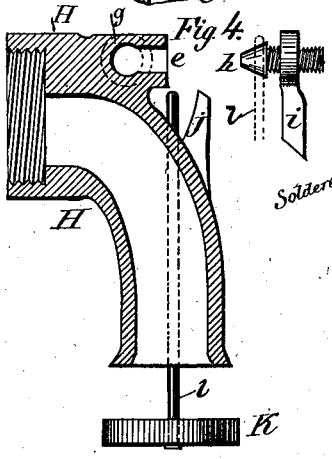


Fig. 5.

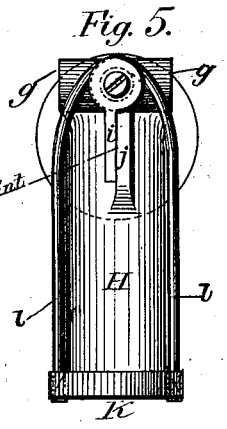
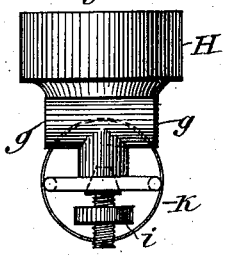


Fig. 6.



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UNITED STATES PATENT OFFICE.

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FIRE-EXTINGUISHER.

SPECIFICATION forming part of Letters Patent No. 307,456, dated November 4, 1884.

Application filed March 29, 1884. (No model.)

To all whom it may concern:

Be it known that I, FRANK GRAY, of the city of New York, in the county and State of New York, have invented a new and useful Method of and Apparatus for the Automatic Extinguishment of Fires in Buildings, which invention or improvement is fully set forth and illustrated in the following specification and accompanying drawings.

The object of this invention is to provide a simple and efficient means for the automatic extinguishment of fires, particularly in buildings such as mills, factories, warehouses, and other structures containing much combustible material, or which for any reason may be more or less exposed to destruction by fire.

The invention consists, broadly, in the employment of a column of compressed air within a pipe or pipes, which air closes a water-check valve pressed upon its opposite side by a column of water of a head sufficient to reach any desired height, an air-seal of fusible metal being provided, so that when the imprisoned air is released by the fusion of said seal the water under its own head or pressure opens said check-valve and is forced through an extinguishing-pipe, but not through said air pipe or pipes, into a certain area of the surrounding space.

The invention also consists in certain details of construction and arrangement, hereinafter particularly described, and set forth in the claims.

In the accompanying drawings, Figure 1 shows in elevation a general view of the arrangement of the pipes and valves of an apparatus embodying the principle of this invention, fitted for supplying one level or floor of a building, a compression-pump being shown attached to said apparatus. Fig. 2 shows in plan the extinguishing-pipe illustrated in Fig. 1 as laid along the ceiling of a building, and having a number of discharging or sprinkling orifices placed at intervals of its length. Fig. 3 shows enlarged a vertical section of the compression-pump and water-check valve shown in Fig. 1. Fig. 4 is a vertical section of an air-releasing and water-discharging device forming part of this invention, showing the air-releasing valve detached from its seat. Fig. 5 is an end elevation of Fig. 4 from its right-hand side, showing the air-releasing valve seated and held to its seat by a soldered joint. Fig. 6 is a view in plan of the device illustrated in Figs. 4 and 5.

In said figures, the letter A indicates an air-compression pump; *a*, its handle; *b*, its rod, and *c* its valve, opening downward. Below said pump is the compression-chamber B, provided with inlet or air-check valve C, an outlet-pipe, *d*, and a water-check valve or piston, D. Below said valve D is the main water-pipe E, leading from any suitable source having a sufficient head, such as a city main or an elevated tank. The lower disk of the valve D laps the port F, so that no water can flow beyond said valve until it uncovers said port by rising. The pipe E is led thence beyond the port F, and discharges into the extinguishing-pipe G, provided with the releasing and discharging device H, hereinafter described. The air-pipe *d*, of small bore—one-eighth of an inch only in diameter is usually sufficient—is led from the air-compression-chamber B up to each of the releasing and discharging devices H, uniting with them in a socket or tube, *g*, by which the line of pipe *d* is made continuous. Said socket is provided with a valve-seat, *e*, and a valve, *h*, is fitted thereto, its arm *i* being soldered to the lug *j* of the device or elbow-pipe H, and thus said valve is secured in its seat as long as said solder remains intact. The lower end of the elbow H is closed by a disk or valve, K, held up to its seat by the yoke *l*, which is suspended upon the stem of the valve *h*.

The solder used for the joint *i j* is made of any of the known alloys which fuse at a temperature, say, from above 155° Fahrenheit to a temperature not above 600°, so as to insure its fusion upon the occurrence of a rise of temperature caused by even a slight fire within its proximity.

The complete operation of this apparatus is as follows: The available head or pressure of the water being determined, the air is compressed by the action of the pump A until the pressure-gage M, provided for the purpose, indicates an air-pressure in the compression-chamber B and tube *d* sufficient to retain the water-check valve B securely closed over the

port F. This is all that is required in order to set the apparatus ready for action should a fire occur within the area protected by the extinguishing-pipe G. An occasional inspection of the gage M to ascertain if there has been any escape or leakage of air is all the attention the apparatus requires. Now, should a fire occur within any apartment or room through which the extinguishing-pipe G is led, and thereby the temperature of any part of said room be raised to the fusing-point of the solder which forms the soldered joints *i j*, at least one of said joints will immediately fuse. The pressure of air in the pipe *d* will consequently blow one of the valves *h* from its seat, thereby allowing the imprisoned air to escape out of the pipe *d* and compression-chamber B, reducing the pressure in said chamber to that of the atmosphere only. This action causes the column of water in the pipe E below the valve D to instantly raise said valve and rush through the port F up to and into the extinguishing-pipe G, and thence through and out of at least one of the elbows H past its valve or disk K into and upon the incipient fire. It will be observed that as soon as one valve *h* is forced from its seat by the escaping air consequent upon the fusion of a soldered joint the yoke *l* will be released from the stem or head of the valve *h*, and thus the disk K be dropped into the position shown in Fig. 4, for the escape of the water. This disk or valve K may be fitted with any well-known form of scattering-plate or sprinkler, for spraying the escaping water. The soldered joints, all being above the water discharged, are free from possible cooling by leakage, and are also nearer the ceiling, where the hottest air will accumulate and more quickly fuse said joints than if they were below the water-discharge. Where many different floors or levels are to be served, a separate compression-chamber, an air-check valve, *d'*, and water-check valve may be fitted upon each of said floors, by which arrangement only the extinguishing-pipe supplying the floor upon which a fusible joint or joints should happen to melt will be filled, the other extinguishing-pipes remaining empty until one or more of their respective fusible joints should melt; and if it be desired to exclude the water even from the stand-pipe and entire building until a fire actually occurs, an additional compression-chamber fitted with a water-check valve—such as D—and connected with the others by a pipe—such as *d*—is all that is required to be done.

The advantage of excluding the water from as many of the pipes as possible, as well as of automatically admitting it when a fire occurs only to the extinguishing-pipe of the floor or level where such fire occurs, is manifold, not only to prevent freezing in the pipes, but also to prevent the deposit of mud or sediment, which in the course of time with some waters used would entirely clog up the pipes or sprinklers, and thus prevent the escape of the water when the fusible joint was melted by a fire. Another reason, also, is that where, as in some localities, the storage-supply of water is not great compared to the number of floors to be served, it is advisable to concentrate the whole source of supply of water into the particular extinguishing-pipe supplying the floor where the fire originates.

I am aware that fusible joints soldered as herein described are not new.

I am also aware that water-check valves of differential area with arrangements of weights and pass-over valves operated by chains with fusible jointed links are in common use, whereby the pressure of the water is caused to open said valve by the fusing of a soldered link in said chain, and thus to automatically extinguish fire; but in all such cases the water either constantly fills the extinguishing-pipe, or, if excluded, it could not be sprayed or sprinkled upon the fire until at least two joints had melted—one to let it into the extinguishing-pipe, and the other to let it out of the same through the sprinkler upon the fire.

By the system herein described—entirely novel, with the fewest and simplest parts, all the auxiliary parts being very small—under no circumstances is it required to fuse more than one joint in order to instantly spray the water upon the fire occasioning such fusion.

In carrying out the principle of my invention I do not confine myself to the special devices of valves or pump shown, as well-known equivalents may be substituted for them. It is quite obvious, also, that in case the air-pressure upon the valves *h* should for any reason fail (or if the air-pipes *d* should be entirely omitted) the dry-pipe system herein described would simply be transmuted into a wet-pipe system, wherein the water would fill the pipes within the building instead of being excluded therefrom, as hereinbefore described. It is preferable, however, to suspend the yoke *l* exactly as shown in the drawings, even if the valve or plug *h*, instead of acting as a valve, should be merely a pin or stem bearing against an imperforate seat instead of against the valve-seat *e*, for it will be observed that the taper given to the air valve or plug *h* is of use in drawing the water-discharge valve K tight to its seat, by said taper acting as a wedge in elevating the yoke *l* when the threaded stem of the valve or plug *h*, passing through the arm *i*, is screwed up, for said plug is thus pressed forward into its seat, and at the same time by its taper presses upward the yoke *l*, and with it the water-discharge valve K, firmly to its seat.

Having thus fully described my said method in all its details, as of my invention I claim—

1. In a system of water-distributing pipes for the automatic extinguishment of fires, an independent pipe for conveying compressed air upon a valve situated between said air-pipe and a water-distributing pipe and excluding the water and said air from said distribut-

ing-pipe, whereby the water is admitted to said distributing-pipe when the air is released from said air-pipe, substantially as and for the purposes set forth.

2. In an automatic fire-extinguishing system, in combination with a water-distributing pipe and a water-supply pipe provided with a check-valve for excluding both air-pressure and water from said distributing-pipe, an air-releasing and water-discharging device consisting of an independent air-pressure pipe provided with an air-releasing valve, as *h*, held closed by a soldered joint fusible at a low temperature and coupled to a water-discharge valve, as K, connected with said distributing-pipe, whereby the water in said supply-pipe is permitted to open said check-valve and to escape into said distributing-pipe and out of said water-discharge valve by the release of the air imprisoned in said air-pipe consequent upon the fusion of said joint, substantially as and for the purposes set forth.

3. The releasing and discharging device hereinbefore described, consisting of an elbow-pipe provided with an air-releasing valve and a water-discharge valve coupled together when closed, said releasing-valve being held to its seat by a soldered joint situated above said discharge-valve, substantially as and for the purposes set forth.

4. In an automatic fire-extinguishing apparatus, a releasing and discharging device consisting of an elbow-pipe provided with a water-discharge valve coupled by a yoke or link to a conical stem seated in a seat upon said pipe, and adjustably held to said seat in an arm secured to said pipe by a joint fusible at a low temperature, substantially as and for the purposes set forth.

5. In an automatic fire-extinguishing apparatus, an air-compression chamber provided with an air-check valve, a water-check valve or piston closed by and excluding the air compressed in said chamber from passing to said water-check valve's eduction side, and a valve for releasing said air from said chamber, whereby when said air-releasing valve is opened said water-check valve is free to open by water-pressure and discharge such water while excluding it from said compression-chamber, substantially as and for the purposes set forth.

6. In an automatic fire-extinguishing apparatus, in combination with a pump for compressing air or other gaseous fluid, an air-check valve, a water-check valve, and an air-releasing valve coupled to a water-discharge valve and secured to its seat by a solder or alloy forming a fusible joint, the whole connected by suitable pipes, and operating substantially as and for the purposes set forth.

7. In an automatic fire-extinguishing apparatus, in combination with a pump for compressing air or other gaseous fluid, an air-check valve, and a water-check valve or piston of differential area having its largest area opposed to the compressive action of the pump, whereby said valve is held closed by a less air-pressure per square inch against a greater water-pressure per square inch, substantially as and for the purposes set forth.

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