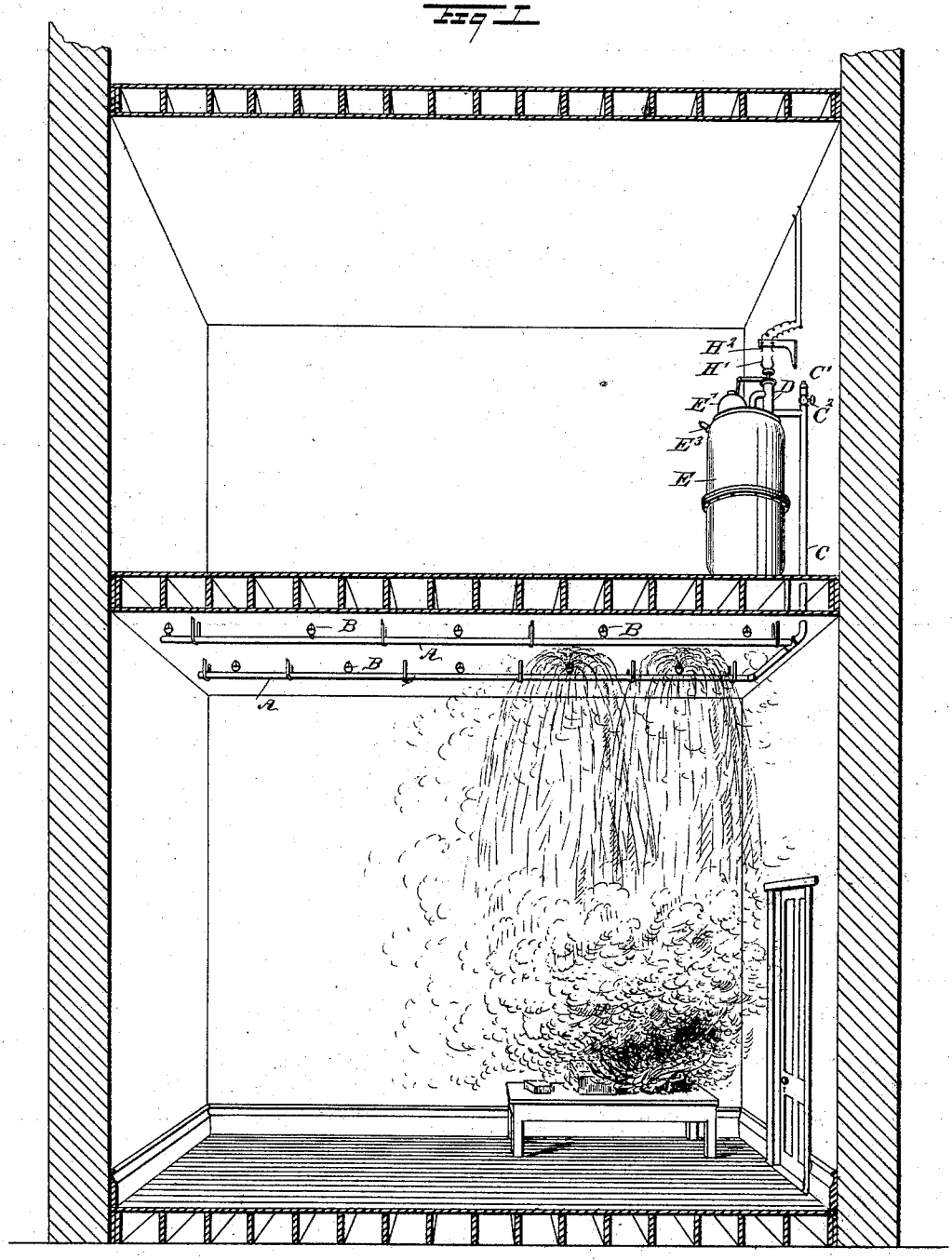
(No Model.) 2 Sheets—Sheet 1.

E. LIVINGSTON.

AUTOMATIC FIRE EXTINGUISHER AND ALARM.

No. 504,926. Patented Sept. 12, 1893.

Fig 1.



WITNESSES:

H. Walker
C. Sedgwick

INVENTOR

E. Livingston
BY Munn & Co

ATTORNEYS.

(No Model.) 2 Sheets—Sheet 2.

E. LIVINGSTON.

AUTOMATIC FIRE EXTINGUISHER AND ALARM.

No. 504,926. Patented Sept. 12, 1893.

Fig 2

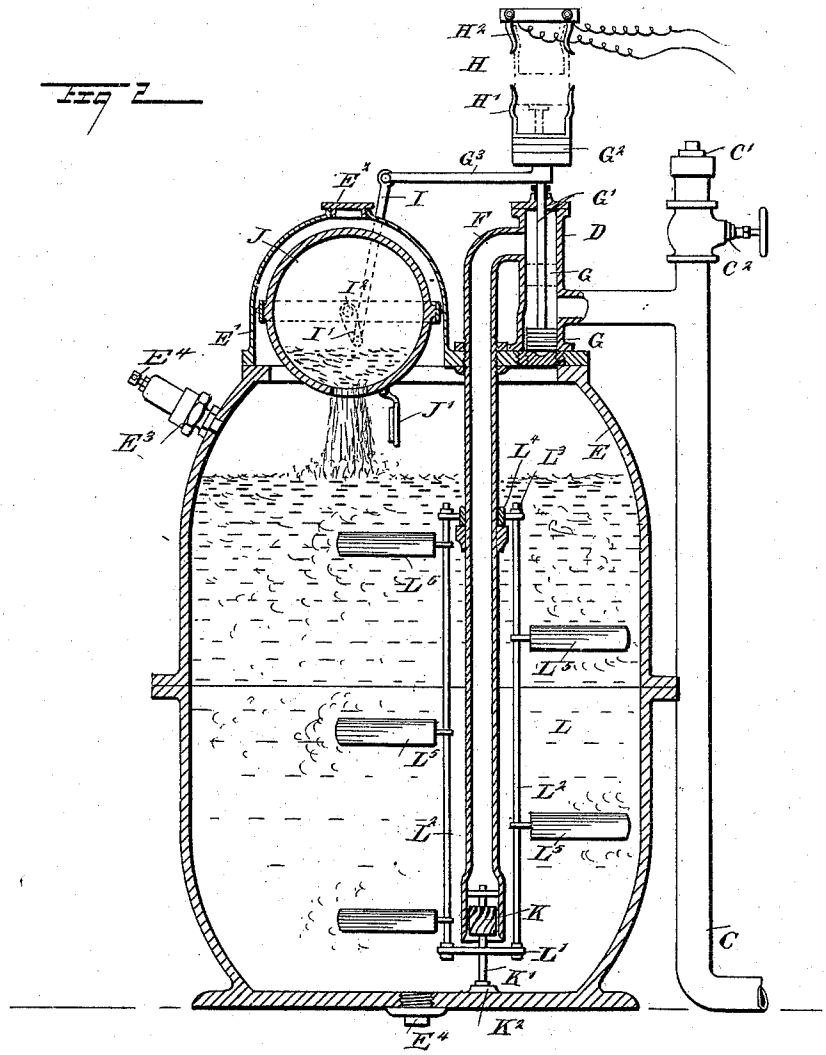


Fig 3

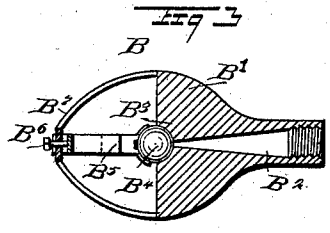
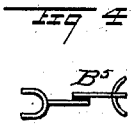


Fig 4



WITNESSES:

H. W. Walker

C. Sedgwick

INVENTOR

E. Livingston

BY Munn & Co

ATTORNEYS.

UNITED STATES PATENT OFFICE.

EDWARD LIVINGSTON, OF NEW ORLEANS, LOUISIANA, ASSIGNOR OF ONE-HALF TO HARRY M. ISAACSON, OF SAME PLACE.

AUTOMATIC FIRE EXTINGUISHER AND ALARM.

SPECIFICATION forming part of Letters Patent No. 504,926, dated September 12, 1893.

Application filed January 31, 1893. Serial No. 460,299. (No model.)

To all whom it may concern:

Be it known that I, EDWARD LIVINGSTON, of New Orleans, in the parish of Orleans and State of Louisiana, have invented a new and Improved Automatic Fire Extinguisher and Alarm, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved automatic fire extinguisher and alarm, which is simple and durable in construction, very effective in operation, and designed for use in buildings, to automatically extinguish fires and at the same time give an alarm.

The invention consists of a series of pipes arranged in the rooms of the building and filled with a fluid, the pipes being connected with a supply tank and each being provided with fusion valves adapted to open and form an outlet for the fluid contained in the pipes on the melting of the fusion valves, and a tank for generating a fire extinguishing gas, the devices for generating the gas being under the control of the fluid contained in the said pipes.

The invention also consists of certain parts and details and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a perspective view of the improvement as applied. Fig. 2 is an enlarged sectional side elevation of the generating tank. Fig. 3 is an enlarged sectional side elevation of one of the fusion valves or plugs, and Fig. 4 is a side elevation of the crotch for holding the ball valve in place.

The improved automatic fire extinguisher and alarm is provided with a series of pipes A arranged, preferably, near the ceiling in each of the rooms of the building to be protected against fire by the apparatus. Each of the pipes A is provided with one or more fusion valves B, preferably of the construction illustrated in Fig. 3, the valves being arranged to open as soon as the temperature in the room exceeds, say about 160°, so that the fluid of liquid, gaseous or compressed gaseous form and contained in or passing into the pipes A can pass through the valves upon the fire, to extinguish the same. Each valve is, for this purpose, provided with a body B′ containing a cone-shaped outlet B^2 connected at its base with the respective pipe A, the apex end of the outlet B^2 opening into a valve seat B^3, normally closed by a ball valve B^4 securely held in place in its seat by a fusion crotch B^5, preferably made as shown in Fig. 4; that is, of two sections connected with each other at their middle by a fusion solder. The outer end of the crotch B^5 is engaged by a set screw B^6 held in a spider or cage B^7 projecting from and supported on the valve body B′. Now, it will be seen that when the temperature in the room rises above 160°, the fusion solder on the crotch disconnects the sections thereof, so that the lock for the ball valve B^4 is removed and the pressure of the fluid contained in the pipes A can force the respective ball valve off its seat, thus permitting the escape of the fluid through the outlet opening B^2.

The several pipes A are connected with a general supply pipe C, preferably vertically disposed and connected with a small cylinder D held on a supply tank E located in a suitable part of the building to be protected against fire. The general supply pipe C is provided at its upper end with a connection for attaching the pipe to a pump or other suitable means for filling the pipe C and the pipes A with a fluid under pressure, for the purpose hereinafter more fully described. When the several pipes have been filled the upper end of the pipe C is closed by a plug C′. A valve C^2 is also arranged in the upper end of the pipe C for closing the latter as soon as the pipes are filled and before the pipe and pump are disconnected.

From near the upper end of the cylinder D extends a pipe F, which passes downward through the cover of the tank E, to extend within the latter and to within a short distance of the bottom of the same, as is plainly indicated in Fig. 2. This tank E is filled with a solution of water and soda, and in it can be generated a carbonic acid gas, so as to force the contents of the tank through the pipe F into the cylinder D, and from the latter to the pipe C, to force the contents of the latter into

the room in which the fire occurs, as soon as the fusion valves are opened, as previously described.

In the cylinder D is arranged a piston G adapted to disconnect the pipe F from the pipe C as long as the apparatus is in a normal position, the piston then standing between the pipes F and C, as indicated in dotted lines in Fig. 2. The piston is held in this position by the fluid pumped into the pipe C, as previously explained. The piston rod G′ of the piston G extends upward to the upper end of the cylinder D and carries at its outer end weights G^2 and the spring plates H′ forming part of an electric circuit breaker H, connected with a suitable alarm at a distant station, the circuit being normally closed by the spring plates H′ engaging corresponding spring plates H^2, from which lead the electric wires to the alarm. The spring plates H′ and H^2 are in contact with each other as long as the piston G stands in its normal position between the pipes F and C, but as soon as the fluid flows out of the pipe C on the melting of one of the series of fusion valves B, then the piston G slides downward in the cylinder D, by the action of the weights G^2, whereby the contact between the plates H′ and H^2 is broken and consequently an alarm is sounded. On the outer end of the piston rod G′ is also secured an arm G^3 pivotally connected by a link I with a crank arm I′ secured on one of the trunnions I^2 of a spherical V-shaped vessel J, containing sulphuric acid or other desirable chemical for generating a gas within the tank E, as hereinafter more fully described. The vessel J is preferably made of glass, and has its trunnions I^2 journaled in an extension E′ formed on top of the tank E, the said vessel being provided with a hinged stopper J′ which is self-opening as soon as the vessel J is swung into the position shown in Fig. 2, the stopper J′ then being on the bottom and swinging outward to permit the contents of the tank J to discharge into the tank E so as to generate a gas under pressure.

The extension E′ is provided on its top with a cap E^2, which is located directly opposite the stopper J′ as long as the vessel J is in its normal position, the said stopper then being in an uppermost position. Now, when the fluid in the pipe C flows downward, as previously described, on the opening of one of the fusion valves B, then the downwardly sliding piston G carries the arm G^3 in a like direction, so that the link I acting on the crank I′ causes the vessel J to turn into the position shown in Fig. 2, whereby the contents of the vessel are discharged into the tank E, to generate gas. In the said tank E, near the upper end of the same, is arranged a filling plug E^3 for charging the tank with a solution of soda and water, as above mentioned. In the bottom of the said tank is arranged an outlet plug E^4 for cleaning the tank whenever necessary. There is also a safety valve E^4 of any well known form provided in the plug E^3 in case a leak in the pipes should cause the piston G to descend abnormally.

In the lower end of the pipe F is arranged a water wheel K secured on a vertically disposed short shaft K′, set at its lower end in a step K^2 attached to the top surface of the bottom of the tank E, as is plainly shown in Fig. 2. On this shaft K′ is held a revolving agitator L, for stirring the liquid solution in the tank E, so as to mix the said solution with the acid discharged on the emptying of the contents of the vessel J into the said tank E, as above described. This agitator L is provided with an arm L′ secured on the shaft K′ and connected by vertically-disposed rods L^2 with a second arm L^3 journaled on a suitable bearing L^4 held on the pipe F, near the upper end of the same, see Fig. 2. From each of the rods L^2 extend agitating arms L^5, which pass through the liquid as soon as the shaft K′ is revolved.

The operation is as follows: When the apparatus is in a normal position, the pipes A and C are filled by a fluid pumped into the pipe C, as previously described, the piston G in the cylinder D then being held in an uppermost position by the fluid contained in the pipe C. The vessel J is in an uppermost position and is charged with sulphuric acid, while the vessel E contains a solution of water and soda and is closed to the pipes F, C, by the piston G. Now, when fire breaks out in any part of the building one or more of the fusion valves B are opened by the heat, so that part of the fluid in the said pipes A can escape into the fire, whereby the fluid in the pipe C falls or escapes, and consequently a fall in the fluid in the cylinder D takes place, so that the piston G slides downward to finally connect the pipes F and C with each other by the cylinder D. At the same time the downwardly moving piston rod G′ changes the position of the vessel J, so that the contents of the latter are emptied into the tank E and a carbonic acid gas is generated, which exerts a pressure on the liquid contained in the tank E, and this liquid flows through the lower end of the pipe F and up the same to the cylinder D, and through the same into the pipe C, and to the pipes A. Now, the liquid flowing up the pipe F revolves the wheel K, so that the agitator L is set in motion, thus agitating the liquid contents of the tank E, whereby the carbonic acid gas is mixed with the said liquid and passes with the latter through the pipe F to the pipe C and the pipes A, to finally pass upon the fire through the previously opened fusion valve B, so that the fire is rapidly extinguished.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination in an automatic fire extinguishing apparatus, of pipes adapted to be filled with an extinguishing liquid, a supply tank having its outlet connected with said

pipes a device for delivering thereto a gas generating substance, and a cut off between the tank outlet and the distributing pipes, the said cut off having connection with the device for supplying the gas generating substance, and serving to operate the same and connect the supply tank and pipes, upon reduction of pressure in the pipes, substantially as described.

2. An automatic fire extinguisher and alarm, comprising a series of pipes filled with a fluid under pressure, and provided with fusion valves, a cylinder connected with the said pipes and containing a piston held in an uppermost position by the fluid in the pipes, and a tank containing a fluid and provided with an outlet pipe opening into the said cylinder above the piston, substantially as shown and described.

3. An automatic fire extinguisher and alarm, comprising a series of pipes filled with a fluid under pressure, and provided with fusion valves, a cylinder connected with the said pipes and containing a piston held in an uppermost position by the fluid in the pipes, a tank containing a fluid and provided with an outlet pipe opening into the said cylinder above the piston, and a vessel containing a gas generating fluid and adapted to be discharged into the said tank on the downward movement of the said piston, which takes place when the fluid in the said pipes is discharged, substantially as shown and described.

4. An automatic fire extinguisher and alarm, comprising a series of pipes filled with a fluid under pressure, and provided with fusion valves, a cylinder connected with the said pipes and containing a piston held in an uppermost position by the fluid in the pipes, a tank containing a fluid and provided with an outlet pipe opening into the said cylinder above the piston, a vessel containing a gas generating fluid and adapted to be discharged into the said tank on the downward movement of the said piston, which takes place when the fluid in the said pipes is discharged, and an agitator arranged in the said tank and adapted to actuate the liquid therein as soon as the latter flows through the outlet pipe, substantially as shown and described.

5. An automatic fire extinguisher and alarm, comprising a series of pipes filled with a fluid under pressure, and provided with fusion valves, a cylinder connected with the said pipes and containing a piston held in an uppermost position by the fluid in the pipes, a tank containing a fluid and provided with an outlet pipe opening into the said cylinder above the piston, a water wheel arranged in the lower end of the said tank outlet pipe and adapted to be actuated by the outflowing liquid, and an agitator held on the shaft of the said water wheel and serving to agitate the liquid in the tank substantially as shown and described.

6. An automatic fire extinguisher and alarm, provided with a series of pipes filled with a fluid and provided with fusion valves, adapted to open to form an outlet for the fluid as soon as the fusion connection for the valve is melted, and a supply connected with the said pipes and adapted to be actuated by the fluid contained in the pipes to generate carbonic acid gas and to force the additional fluid supply into the pipes, and an alarm adapted to be actuated on the outflow of the liquid from the said pipes through one of the open fusion valves, substantially as shown and described.

EDWARD LIVINGSTON.

Witnesses:
C. M. SMITH,
GEO. S. SMITH.