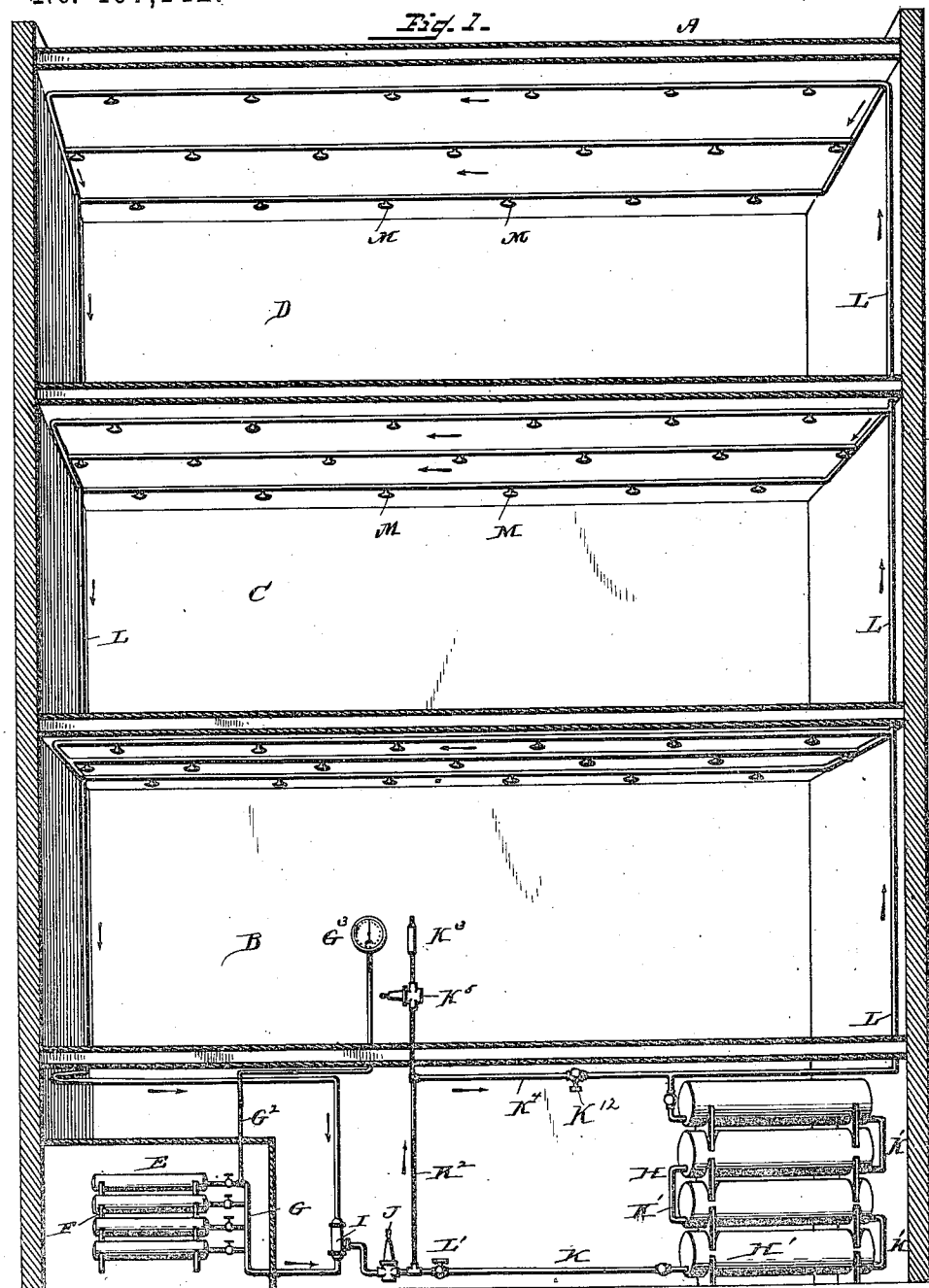


(No Model.)

W. F. SINGER.
CHEMICAL FIRE EXTINGUISHER.

No. 467,142.

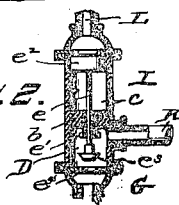
Patented Jan. 12, 1892.



Witnesses

Wm. F. Singer
Carol E. Hart

Fig. 2.



By his Attorney

William F. Singer
Franklin H. Hough

UNITED STATES PATENT OFFICE.

WILLIAM F. SINGER, OF CARTHAGE, NEW YORK.

CHEMICAL FIRE-EXTINGUISHER.

SPECIFICATION forming part of Letters Patent No. 467,142, dated January 12, 1892.

Application filed September 5, 1890. Serial No. 364,053. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM F. SINGER, a citizen of the United States, residing at Carthage, in the county of Jefferson and State of New York, have invented certain new and useful Improvements in Stationary Automatic Fire-Extinguishers; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to certain new and useful improvements in stationary automatic fire-extinguishers; and it has for its object to provide a new and improved apparatus of the kind mentioned in which the equipped building is provided with a battery of gas-reservoirs adapted to be charged with carbonic-acid gas compressed to a liquid form, in connection with a separate series of reservoirs containing water, connections between the said gas-reservoirs and the water-reservoirs, whereby the gas may be admitted to the water-reservoirs and will serve to force the water through suitable pipes with which the building is equipped, the pipes in the several stories of the building with sprinkler-heads, which, when opened by the action of heat, will serve to distribute the mingled gas and water throughout the apartment.

To these ends and to such others as the invention may pertain the same consists in the peculiar construction and in the novel combination, arrangement, and adaptation of parts, all as more fully hereinafter described, shown in the accompanying drawings, and then specifically defined in the appended claims.

The invention is clearly illustrated in the accompanying drawings, which, with the letters of reference marked thereon, form a part of this specification, like letters of reference indicating like parts throughout the several views, and in which drawings—

Figure 1 is a vertical section of a building provided with my improved fire-extinguishing apparatus. Fig. 2 is a central vertical section of the automatic check-valve. Fig. 3

is a similar view of the automatic pressure-regulator.

Reference now being had to the details of the drawings by letter, A designates the building, and B, C, and D the several stories of the same.

Within a suitable compartment in the basement of the building is arranged a series or battery of gas-reservoirs E. These reservoirs are preferably arranged one above another, and are in the present instance shown as supported by suitable arms or brackets F, extended from the wall of the compartment. These reservoirs are adapted to contain a non-combustible gas compressed to a liquid form and are each connected with the common pipe G, from which the gas is admitted to the lower reservoir H' of the series H of water-reservoirs after passing through the check-valve I and the automatic pressure-regulator J, as will be hereinafter explained. It will be understood that the gas is held within the gas-reservoirs under a much higher pressure than is required in forcing the water from the water-reservoirs to the sprinkler-heads, and hence the pressure-regulating valve J is introduced between the gas and water reservoirs for the purpose of reducing the pressure to the proper limit.

The series H of water-reservoirs is arranged in the basement of the building and in close proximity to the gas-reservoirs, and the reservoirs in the series, like the gas-reservoirs just described, are arranged one above the other and have pipe connections at their ends so arranged that the water will pass from the lower reservoir into the one directly above it by means of the pipe K, thence through the pipe K', which leads from the lower edge of the reservoir-head at the opposite end of the reservoir to the lower edge of the reservoir-head directly above it, and thence through similar pipes arranged alternately at opposite ends of the battery of reservoirs to the upper reservoir in the battery, from which the water passes into the pipe L, which leads throughout the building, and is provided at convenient or suitable intervals with sprinkler-heads M, which heads may be of any suitable construction adapted to distribute the water and gas in the apartment when the head is opened

by heat. Many forms of these heads are now in common use, and as their construction and operation are familiar to those skilled in the art to which this invention pertains and as
 5 in the present application no claim is made to the construction of the sprinkler-head I will not in this connection attempt a description of the same.

The pressure-regulating valve J is of ordinary and well-known construction and serves to automatically regulate the pressure of the gas passing through it, and as valves of this character are common and their operation well understood a detailed description is
 15 deemed unnecessary as such construction forms no part of this invention, as any of the pressure-regulating valves of this character are equally well adapted for use in this connection.

The construction and operation of the automatic valve I will be best understood upon reference to Fig. 2 of the drawings. It will be understood that the body portion of this valve is divided by means of the central horizontal partition *b* into two chambers *c* and *d*.
 25 Passed vertically through the partition *b* is the piston-rod *e*, a suitable gland and stuffing-box *e'* being provided within the partition *b*. A piston *e²* is provided at the upper end of the piston-rod, and at its lower end the rod is provided with a valve *e³*, adapted when the rod is at its lowest point to close the opening *e⁴* in the valve-seat *e⁵*. The operation of this valve will be presently explained in connection with the description of the operation of
 35 the system.

The pipe K, which leads from the pressure-regulator to the water-reservoirs, is provided with a valve L', and between the regulator and valve L' a small pipe K² leads upward to the first story of the building, where it is provided with a whistle K³ at the upper end of the pipe. Leading from the whistle-pipe at a point adjacent to the floor of the apartment is a pipe K⁴, which connects with the pipes L of the building, and at a point upon the pipe K² above the point at which it connects with the pipe K⁴ is provided a pressure-regulating valve K⁵, for a purpose which will presently appear. A shut-off valve K¹² is provided in the pipe K⁴, for a purpose which will presently appear.

A small pipe G² leads from the common pipe G to some convenient place in the building, where it is provided with a gage G³, which will serve to at all times indicate the pressure of the gas within the storage-reservoirs.

In operation, the gas and water reservoirs having been filled, the valve L' is closed and the valve K¹² is opened and the gas is allowed to enter the common pipe G, from whence it will pass through the pressure-regulating and check valves I and J, respectively. The valve L' being closed, the gas enters the pipe K², and thence through the pipe K⁴ it passes to the pipes L of the building system, and after

passing through the pipes of the building it will return to the pressure-regulating valve I, as indicated by arrows in Fig. 1 of the drawings. As this valve is constructed to close when a slight predetermined pressure is reached in the pipes of the building system, the gas will continue to flow into the building-system pipes until said predetermined pressure has been reached, when it will serve to close the valve. The pressure thus maintained within the building-system pipes is less than that necessary to operate the valve K⁵ upon the whistle-pipe, and said whistle will not be sounded until a greater pressure is secured. The building-pipes having thus been filled with gas at a nominal pressure, the valve K¹² is closed and the valve L' is opened and the gas is allowed access to the water-reservoirs; but as the building-system pipes have been previously charged sufficiently to close the regulating-valve I the full pressure of the gas from the gas-reservoirs upon the gas thus entering the water-reservoirs has been cut off, and it is thus held in readiness to act when the pressure upon the building-system pipes has been released, thus opening the regulating-valve I and admitting the gas from the gas-storage reservoirs. It will thus be seen that the pipes of the building system will at all times be charged with gas under a nominal degree of pressure sufficient to hold the regulating-valve normally closed and sufficient to keep the pipes at all times dry and free from rusting.

In case any of the automatic sprinkler-heads connected with the pipes in the building system are opened by the action of heat this opening of the heads will serve to allow the gas within the pipes to escape, thus automatically relieving the pressure upon the regulating-valve, which will be at once forced open by the pressure of the gas in the gas-reservoirs, and as the valve L, which controls the entrance to the water-reservoirs, is open, the gas will enter said reservoirs and the mingled gas and water will be forced through the pipes in the building system and will pass out through the sprinkler head or heads that have been opened, and will thus serve to extinguish the fire within the apartment within which the sprinkler-head is located.

It is well known that carbonic-acid gas mingled with water is a much more effectual medium for extinguishing fires than would be either gas or water alone, and hence the special value of this form of extinguishing apparatus will be at once apparent.

In order that the operation of the automatic check-valve I may not be confused with that of a pressure-regulating valve, we will suppose, for instance, that the pressure in the gas-cylinders is four hundred pounds per square inch and that the diameter of piston-head *e²* in the valve is two and one-half inches and the diameter of the check-valve *e³* at the lower end of the piston-rod is one-half

inch. It will thus be seen that a pressure of one pound upon the piston will serve to close the check-valve against a pressure of twenty-five pounds, and hence a pressure of sixteen pounds in the pipes of the building system will serve to close the valve against the pressure of four hundred pounds in the gas-reservoirs and shut off the supply of gas, and it will also be understood that when the pressure of sixteen pounds within the pipes of the building system is lessened by the escape of gas occasioned by the opening of the sprinkler-heads the valve will be at once opened to its full extent.

15 What I claim as new is—

1. In a fire-extinguishing apparatus having a series of pipes arranged about a room or building, with exposed automatic sprinkler-heads, tanks containing a non-combustible gas, and tanks or reservoirs containing water, said tanks being in connection with the pipes,

and a pressure-regulator acted upon by the gas in the pipes, substantially as shown and described.

2. A fire-extinguishing apparatus comprising, in combination with a room or building, a series of pipes, provided with automatic sprinkler-heads, a storage-reservoir containing a non-combustible gas under pressure, a water-reservoir, connections, substantially as described, between said gas and water reservoirs and the reservoirs and the pipes in the building, and pressure-regulating and check valves interposed between the gas and water reservoirs, all arranged and operating substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM F. SINGER.

Witnesses:

J. E. RAWSON,

GEO. W. MASON.